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ARCHIVES OF PEDIATRICS

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DISEASES OF INFANTS AND CHILDREN

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ORIGINAL COMMUNICATIONS

THE CHEMISTRY OF COW'S MILK AND OTHER PRODUCTS USED IN INFANT FEEDING*

BY FREDERIC W. HOWE, B.S.

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Cow's milk is usually described as being a yellowish-white, opaque liquid, having very little odor and a slightly sweetish taste, amphoteric in reaction, and, according to Van Slyke and Bosworth, of the following composition:

---

* Read as part of a Symposium on Modern Infant Feeding at the New York Academy of Medicine, Section on Pediatrics, November 11, 1915,

Chart I.

Fats	3.90	per cent.
Milk sugar	4.90	" "
Proteins combined with calcium	3.20	" "
Di-calcium phosphate $CaHPO_4$	.175	" "
Calcium chloride $CaCl_2$	.119	" "
Mono-magnesium phosphate $MgH_4P_2O_8$	.103	" "
Sodium citrate $Na_3C_6H_5O_7$	.222	" "
Potassium citrate $K_3C_6H_5O_7$	.052	" "
Di-potassium phosphate K_2HPO_4	.23	" "
Total solids	12.901	" "

But, owing to the fact that it is an animal secretion, we find its composition is influenced by a number of factors, chief of which are:

1. The breed.
2. The health
3. The stage of lactation.
4. The feed.

(1) *Composition of Milk as Affected by the Breed.*

How far the composition is affected by the breed is clearly shown by the work of Lythgoe (Journal Ind. and Eng. Chemistry, Vol. VI., No. 11).

Chart II.

SUMMARY OF ANALYSIS OF SAMPLES OF MILK OF KNOWN PURITY

	Jersey	**Guernsey**	**Grade Durham**	**Ayrshire**	**Dutch Belt**	**Holstein**	**Herd Milk**
No. of samples	36	28	16	27	41	56	47
Total solids:							
Highest per cent.	17.17	17.00	14.89	14.68	14.09	13.96	14.57
Lowest " "	12.43	12.15	11.73	11.44	10.93	10.20	11.56
Average " "	14.75	14.60	13.10	12.64	12.15	11.69	12.79

(2) *Composition of Milk as Affected by the Health of the Animal.*

This point is less easily shown than factor one, because chemistry, until recently, has not developed sufficiently refined methods of analysis to show clearly the results brought about by changes in the health of the animal, although we have considerable clinical data to show that the composition is considerably affected, as, for example, gargety milk.

(3) *Composition of Milk as Affected by the Stage of Lactation.*

The first milk secreted after parturition is known as colostrum milk (a sample of which is shown), and you will note that it is almost lemon yellow in color and has a greater specific gravity than ordinary milk. Its composition is approximately as follows:

ENGLING. TWENTY-EIGHT ANALYSES

Specific gravity	1.068
Total solids	28.31
Fats	3.37
Casein	4.83
Albumin	15.85
Sugar	2.48
Ash	.78

It possesses a distinctively laxative action and is evidently designed by nature to clear out the digestive tract of the meconium. For this reason, the sale of colostrum milk as a food is prohibited by most states for five days after parturition. Other changes taking place during the normal lactation period are not as marked, although there is a tendency toward increase in the percentage of total solids as the lactation period closes, according to Lythgoe:

1 month	12.70
2— 5 months	12.76
6— 9 months	13.03
10—15 months	13.15

(4) *Composition as Affected by Feed.*

Here again, as in factor two, we are confronted by the same difficulties, although to a lesser degree. I have here a sample of milk from a cow where the feed was suddenly changed. You will note that, while the milk is sweet to the taste, yet on heating it will have a curdled appearance. Again, in butter-making it has long been recognized that the consistency of the product is considerably affected by the kind of grain used, oil meal giving a softer butter, bran or lack of grain giving butter a much firmer texture. In clinical results we have similar evidence—diarrhea in cows having a similar effect on some infants, and constipation a corresponding effect, often expressed in the following terms by the country practitioner, "Look out for cases of diarrhea when the cows are turned out to grass in the spring." Undoubtedly cows become gradually adjusted to changes in feed, but it emphasizes the fact that when cow's milk is to be generally used for infant feeding, if a change in feed needs to be made, it should be done gradually.

The fact that milk contains all the constituents needed to sustain life necessarily makes it a substance peculiarly susceptible to changes of various kinds after being drawn from the cow. For convenience in treating of these I have classified them under the following heads:

1. Composition of milk as influenced by physical means
2. " " " " chemical "
3. " " " " bacteriological means
4. " " " " physiological means

(1) *Composition as Influenced by Physical Means.*

The physical composition as regards odor and flavor may be considerably changed by the feeding of strong herbs and vegetables. The color may likewise be affected, according to the recent work of Palmer & Eccles (Jour. Biol. Chem. 17—191—210). In their findings they report that carotin is the principal yellow pigment of milk fats and that this pigment as well as the xanthophylls are not synthesized in the cow's body, but are taken up from the food and subsequently secreted in the milk fats. Continued feeding of non-pigmented foods to milk-giving cows resulted in a gradual decolorizing of the milk fats in the case of Jersey and Guernsey cows, in whose bodies there is a large store of pigments, and a rapid decolorizing of the milk fats from other breeds.

Changes by Manipulation.—Milk is made up of a number of substances, some in solution, some in a colloidal state, and some in suspension. When freshly drawn, it is spoken of as an emulsion. There is, however, a tendency for the fats to separate, owing to their lesser specific gravity. The rate varies according to the breed and even the individual cow. In mixed milks, the separation is marked at eight hours. I have seen individual cases where there was no cream line visible even after standing sixteen hours. By use of an homogenizing machine, the fat globules may be broken into much smaller ones, so small that they may remain in suspension for weeks with no cream line appearing. This fact has been taken advantage of by Ladd in numerous feeding experiments, not only with cream, but olive and cod liver oil, making emulsions lasting for weeks. (ARCHIVES OF PEDIATRICS, July, 1915.)

Changes by heat—usually at temperatures ranging from 140° F. to 212° F. although this is not necessary. If the cream has once separated from the other constituents, there may be considerable variation in the depth of cream line on the second rising, as shown in sample.

(2) *Composition as Influenced by Chemical Means.*

In this paper I am confining myself to the action of those substances which physicians are apt to use in their practice, such as lactic acid, lime water, sodium bicarbonate, sodium citrate and milk of magnesia.

Lactic acid in milk is a product of fermentation of the milk sugar, one molecule yielding by hydrolysis one molecule of dextrose and one molecule of galactose.

$C_{12}H_{22}O_{11}$ plus H_2O equals $C_6H_{12}O_6$ plus $C_6H_{12}O_6$.
$C_6H_{12}O_6$ equals 2 $C_3H_6O_3$.

The casein of the milk is precipitated in a lactic acid medium. There are about three hundred varieties of lactic acid bacilli, and each one exerts its own peculiar action on the casein. Lime-water and milk of magnesia both have an alkaline reaction, and, because of this, act in a similar manner in retarding the precipitation of casein in the form of paracasein in the stomach by rennin. They also act in a similar way in that they both make insoluble soaps of the fats. Milk of magnesia also exerts an astringent action on the epithelial cells of the intestine so that it may be used as a laxative. Sodium citrate and sodium bicarbonate act in a similar way in that they both react with casein to form sodium caseinate, a soluble salt, but the bicarbonate, on account of its having an alkaline reaction, also reacts in another way in that it forms soluble soaps with the fats in the intestine. For a more extended study of the reactions of casein, I would refer you to the brilliant work of Van Slyke and Bosworth, a part of which has just been published in the annual report of the New York Experiment Station for 1914.

(3) *Composition of Milk as Influenced by Bacteriological Means.*

For our purpose the bacteria may be divided roughly into the fermentative and putrefactive types with possibly a sub-grouping of the pathogenic type. According to the work of Kendall and his associates it can be stated almost as a biological axiom that under natural conditions fermentative actions almost invariably precede putrefactive actions. This being true, the souring of milk coming first gives us, as Professor Sedgwick expresses it, a natural danger signal to warn us of what may come later. Of the fermentative types, we have in common use the lactic acid organisms, the acetic acid organisms and the yeasts. I have already stated that there are about three hundred varieties of the lactic acid organisms, capable of bringing about chemical changes in the composition of milk, and this is true in a lesser measure of the yeasts and acetic acid organisms.

Concerning the putrefactive types, we must bear constantly in mind the fact that it is only one step, chemically speaking, from the amino acids, the form in which most of the proteins of milk are absorbed, to the toxins which are produced from these same proteins by the action of certain putrefactive bacteria if the conditions are favorable. Actions of the pathogenic bacteria do not properly come into the scope of this paper.

(4) *Composition of Milk as Influenced by Physiological Means.*

Under this heading we have to consider the action of natural ferments or enzymes and their products. Milk being a complete food, we would naturally expect it to be rich in natural ferments or enzymes. We find this to be the case; according to Kastle and Roberts, we have present diastases, galactases (a very poor name, as it would naturally indicate action upon the carbohydrates when in reality they act upon the proteins), lipases, catalases, peroxidases and reductases. Each one of these has its own specific action on the constituents of milk, fulfilling its function in the part of self-digestion.

Milk is not a perfect food unless we have a perfect cow and a perfect calf. When we attempt to use this product in infant feeding, we need the assistance of all the natural ferments in order to bring about the optimum assimilation. The splendid work being done by Osborne, Mendel and others makes us realize the importance of these obscure and little studied substances, but a discussion of this would occupy a paper in itself.

THE CHEMISTRY OF OTHER PRODUCTS USED IN INFANT FEEDING

Under this heading we include milk sugar, malt soup, dextri-maltose, sucrose, dextrose, cereal jellies, protein milk, protein milk plus lactic acid milk, whey and proprietary foods.

Milk sugar is obtained from the whey of milk by evaporation, crystallization and subsequent purification. A good milk sugar should contain approximately 98 per cent. of milk sugar and give no test for albumin. It being the natural sugar in milk, it is very generally used in the making of milk modifications, but conditions often arise which indicate the use of other sugars, the reasons for this being due to the relative ease with which the different sugars undergo fermentation and the amounts of each that can be assimilated.

Lactic (m.f.)	Butyric	Alcoholic
Levulose	Levulose	Maltose
Lactose	Maltose	Invert sugar
Dextrose	Dextrose	Cane sugar
Invert sugar	Invert sugar	Dextrose
Cane sugar	Cane sugar	Levulose
Maltose	Lactose	Lactose

ASSIMILATION LIMITS

Lactose	120 grams
Cane sugar	150—200 grams
Levulose	200 grams
Dextrose	250 grams

Malt soups and dextri-maltose are commercial products in which the sugar maltose is a prominent constituent. They are generally used, as the price of pure maltose, ranging around $2 per pound, is prohibitive for general use in infant feeding. The approximate compositions of the malt soups and dextri-maltose are as follows:

	Loeflund's	Neutral	Mead's Dextri-maltose
Maltose	57.10	64.00	52.00
Dextrins	30.90	13.17	41.00
Proteins	.57	3.80	
Salts		1.26	2.00

The malt soups are generally made by the diastatic fermentation of barley, but, owing to the subsequent extraction and evaporation of the soluble constituents of the grain, no one, so far as I know, possesses any diastatic activity. They contain a considerable amount of mineral salts and probably phytin. It is probable that their well-known laxative action is largely due to these factors.

Dextri-maltose is generally made from potato starch and consequently contains only a small amount of the natural mineral salts and no phytin. You will note that, whereas the total percentage of mineral salts is as great as in the case of the malt soup, this is largely due to the addition of common salt. The slight constipating action which this product sometimes has is probably due to this fact. These products give the physician additional opportunities according to intestinal indications. For fuller description, I would refer you to Percy's work at the Children's Hospital, Boston.

Sucrose or ordinary sugar is one of our purest foods. In composition it ranges from 97 to 99.5 per cent. sucrose. Its chemical action is too well known to need any description here.

Dextrose is the natural body sugar and for that reason one would expect to find many references to its experimental use in infant feeding, but the opposite seems to be the case, though Kendall used it to some extent in his experiments on the Boston Floating Hospital. It is generally manufactured from corn, and may be obtained in the market in the impure form for about ten cents a pound, both in the dry state and liquid, the latter as Karo Syrup. The pure dextrose sells for about $2 a pound.

The cereal jellies in general use are those from barley and oats, though rice is sometimes used, and there seems to be no good reason why arrowroot, corn-starch and wheat flour could not at times be used to advantage. Their action is generally physical, and indicated in the case of difficulty in the digestion of casein and sugar, or both. Casein is precipitated in a more flocculent form on account of the colloidal nature of the cereal jelly and the intestinal tract is protected for the same reason against the irritation produced by the sugars. Of the barley products on the market, the two in general use are Brooks's, an American product, and Robinson's, an English one. I am mentioning the place of manufacture, for it sometimes happens that barley flour becomes slightly rancid if kept too long, a point to be avoided if the product is to be used in a milk modification. The analysis of each is as follows:

	Brooks's	Robinson's
Fats	.84	.41
Protein	7.93	7.46
Carbohydrates	83.97	81.57
Salts	.57	.94

Of the oat products on the market, I know of only one in general use, and that an English product and known as Robinson's Groats. I am sorry to say that I have not had time to make an analysis of it. In the directions given for the making of cereal jellies, there seems to be a great diversity of opinion. For a fuller discussion of this, reference is made to the work done by Ladd. (ARCHIVES OF PEDIATRICS, April, 1908.) I would like to emphasize his conclusion, namely, that, in order to obtain uniform results, it is desirable to use definite percentages of starch. In the use of cereal jellies, I wish to call attention to one point sometimes overlooked, that, owing to the fact that more or less crude fiber is always present in both oat and barley flours, milk modifications containing them always contain a residue, sometimes spoken of by the mother as black specks (as seen in the samples).

Protein Milk.—This is usually made by precipitating the casein in a quart of fat-free milk by either essence of pepsin or rennin; the resulting curd is rubbed through a sieve with enough water to make one pint. Whether the milk is heated in the beginning high enough to precipitate any of the calcium, the length of time the curd is forming, how long it is allowed to drain, how much it is washed, and how it is rubbed through a sieve are all factors which determine its consistency and composition. For feeding purposes it should be gently shaken while heating, and ought not to exceed a temperature of 95° F. The composition is approximately as follows: Fat—00, protein—5.00, sugar—.00 to .25.

Lactic Acid Milk.—The basis for this product is usually fat-free milk which is innoculated with one or more strains of the lactic acid bacilli and incubated to produce the desired acidity. The Bulgaricus is capable of producing 3.50 per cent. of lactic acid and precipitates the casein in a ropy condition, while the ordinary lacticus usually produces an acidity of about .75 per cent. and precipitates the casein in a lumpy condition. The consistency and palatability of the product is dependent on the quality of milk and kind of organisms used, the temperature of ripening, agitation and cooling at the proper time, proper blending and salting. The composition is approximately as follows:

Fats	.00
Protein	3.25
Sugar	4.50
Lactic acid	1.00
Salts	.75

One point regarding the composition which ought to be spoken of and that is concerning the per cent. of sugar. I have often heard it stated that there was very little sugar present, the idea, no doubt, arising from the fact that the lactic acid is derived from the fermentation of the milk sugar. It is a fact that the lactic acid is so derived, but when we stop to realize that one molecule of milk sugar is capable of yielding four molecules of lactic acid ($C_{12}H_{22}O_{11}$ plus H_2O equals 4 $C_3H_6O_3$) and there is usually present in such milks not over 1 per cent. of lactic acid, we can readily see there can be only a slight diminution in the sugar content.

Protein Milk with Lactic Acid Milk—often called Eiweiss or albumin milk (whoever named the last one could not have chosen a more inappropriate one, as the percentage of lactalbumin is comparatively small). This product is really a blended product of protein milk and lactic acid milk with the exception that whole milk is generally used in the making of the protein milk and sometimes natural buttermilk is used in place of lactic acid milk and malt added to the mixture. The main objection to using whole milk in place of fat-free milk is due to the fact that the fats of the milk are not completely retained in the precipitation of the casein when the latter is strained and washed. This accounts in a measure for the conflicting analyses we have of this product. It would seem wiser to use the fat-free milk as a foundation and add a definite percentage of fats in the form of cream to the resulting product.

The composition of the protein milk with lactic acid milk is approximately as follows:

Fats	.00—.05
Proteins	4.12
Milk sugar	2.12
Lactic acid	.50

Whey.—Whey is the product obtained by precipitating the casein of fat-free milk with rennin in the form of paracasein, filtering and treating the resulting whey to a temperature to stop further action of the rennin. The quality of the whey is dependent upon the quality of milk and rennin used, how the rennin is added, the temperature at which the action is allowed to take place, the manipulation of the curd, the straining and the temperature to which the resulting whey is heated. When properly made, whey is a yellowish-green liquid of approximately the following composition:

Fats	.00—.05
Proteins	.80—.90
Lactose	5.10
Salts	.80

Proprietary Foods.—In the nutrition of the infant, we cannot get away from the fundamental facts that fats, carbohydrates, proteins and salts are the essential constituents, and any proprietary food laying claim to being a complete food for an infant must contain all of these in forms which can be readily assimilated and in properly balanced proportions. We all know how difficult it is to keep fats in a sweet and wholesome condition for any length of time, and, while it is not so difficult to keep the proteins, still it is no easy matter. This narrows the field very considerably when it comes to making a proprietary food, and, as a natural result, we find most of them are made of blended carbohydrates in a large measure, milk sugar or maltose, dextrins, and the various starches, all of which can be used at less cost under their respective names and used as desired without the handicap of a blended product which is made to meet conditions in general and no one condition in particular. They have been admirably treated in Holt's book, and I am going to include his analyses in this paper for the purpose of collecting all this data under one heading, but I am not going to weary you by reading their composition.

HOLT'S BOOK

THE COMPOSITION OF INFANT FOODS

	Nestle's Food	Mellin's Food	Malted Milk	Ridge's Food	Imperial Granum	Lacto-preparata	Carnick's Soluble Food
Fat	5.48	0.31	2.66	1.11	1.04	12.35	7.54
Proteids	11.04	10.70	15.18	11.93	14.13	14.51	10.25
Dextrines	7.38	40.96	31.97	1.23	1.38		
Dextrose and Maltose		37.38	31.79	0.52	0.42		
Cane sugar	30.59	4.23	4.15	1.16	trace		
Milk sugar	7.60					63.68	
Total soluble carbohydrates	45.57	82.57	67.91	2.91	1.80	63.68	27.08
Insoluble carbohydrates (starch)	29.95			77.96	76.11		37.45
Inorganic salts	1.72	3.20	3.34	0.49	0.39	3.66	4.42
Moisture	1.50	4.09	2.20	8.58	8.38	5.80	3.42

In closing, I wish to state that I realize I have presented very little that is original (that not being the object of the paper), but have endeavored to compile the somewhat voluminous literature of the subject in such a way as to be of practical use to the busy physician.

TREATMENT OF PYLOROSPASM IN INFANTS — J. Pieser (Monatschr. f. Kinderheil., Bd. XIII., Nr. 3, 1914) says that the means suggested by A. T. Hess for the treatment of pylorospasm in infants, namely, the use of a rubber catheter passed through the pylorus for feeding the infant, meets with some difficulties. The greatest is that of discovering whether the sound is in the duodenum. Only the X-rays are a sure criterion of its presence. The author has treated 2 cases after this method, systematically emptying the stomach through the tube, before feeding with it. In both, the vomiting ceased as well as the emaciation, and the child recovered.—*The American Journal of Obstetrics.*

THE DIGESTIBILITY OF THE PROTEINS OF MILK AND THEIR RÔLE IN INFANT NUTRITION*

BY L. EMMETT HOLT, M.D.

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While in many respects our ideas of infant nutrition and feeding have been modified by the clinical and laboratory researches of the last ten to fifteen years, probably in no direction has the change of view been so marked as that regarding the proteins. It is not many years since the difficult digestion of cow's milk protein was looked upon as the important, probably the chief cause of our troubles in infant feeding, and many were the expedients resorted to, to overcome this difficulty, such as various forms of diluent, peptonizing, the addition of sodium citrate, etc. But we have learned that the symptoms formerly ascribed to the proteins depend upon other conditions. The curds in stools we know are composed chiefly of fat; most of the colic and flatulence are due to carbohydrates, and constipation depends much more on fat and salts than on casein. All researches upon gastric digestion in infants agree that in practically all conditions pepsin is abundantly secreted. The use of such ferments in disturbances of digestion, though still widely resorted to, has no rational basis.

Modern practice has certainly been in the direction of using much higher proportions of protein than were formerly thought wise or safe. It is interesting therefore to inquire whether this custom is justified by our present knowledge of the digestion of protein by the infant, also whether it is advantageous or whether its use is fraught with some disadvantages or possible dangers not apparent on the surface.

Metabolism experiments made at the Babies' Hospital and in many other places have revealed the fact that under almost all circumstances infants possess a remarkable capacity for retaining N. Even in conditions of severe malnutrition, the protein of cow's milk is well borne, as shown by a positive N. balance, even though the infants were losing weight. This capacity on the part of the infant to assimilate protein is an indication of how well nature has provided the means of replacing protein waste and promoting growth above other needs of the organism.

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* Read as part of a Symposium on Modern Infant Feeding at the New York Academy of Medicine, Section on Pediatrics, November 11, 1915.

Clinical evidence also of the infant's tolerance of protein is not wanting. When the question is asked, What are the symptoms of protein indigestion or intolerance? we are compelled to reply that at present we cannot mention any definite symptom or group of symptoms which we can positively attribute to the proteins, in the sense that we can attribute other definite symptoms to the fats and to the carbohydrates.

Under these circumstances it is pertinent to inquire whether the present practice of giving much higher proteins than formerly is one to be recommended without reservation; is this safe? is it advantageous? or is it possibly injurious?

The protein needs of the body must certainly be provided for; but is it desirable to go much beyond this? Many elaborate calculations have been made to determine the actual protein needs of the infant. I think we are safe in assuming that they are supplied in woman's milk in sufficient amount, but in no considerable excess. The most recent analyses of Courtney and Fales show that during the mature period of lactation, *i.e.,* after the first month, the average protein content of woman's milk is slightly less than 1.25 per cent. An infant taking cow's milk as it is now usually modified gets very much more than this.

To put it in another way, assuming an average composition of mature woman's milk to be 3.5 per cent. fat; 7.5 per cent. sugar; and 1.25 per cent. protein, a nursing infant is receiving a little over 7 per cent. of his calories in the form of protein; an average artificially-fed infant of three months, who is taking cow's milk one-half strength with sufficient sugar added to bring the carbohydrates up to 6 per cent., is receiving over 14 per cent. of his calories as protein; while an average infant of six months, who is getting two-thirds milk with the same proportion of sugar, is receiving nearly 17 per cent. of his calories in the form of protein. This is on the assumption that all the N. in woman's milk and in cow's milk is alike available for nutrition, which is not quite true. While this is very nearly the case with cow's milk, woman's milk is known to contain N. in other forms than protein (extractives, urea, etc.), which reduce the available N. by nearly one-fifth. So that the discrepancy between the protein content of the two milks is even greater than at first appears.

Rubner has calculated that on the average the food of the infant should have 7 per cent. of his calories in the form of protein. This we have already seen is practically that which is present in woman's milk. What then becomes of the excess of protein given in our common feeding mixtures? Our own metabolism experiments have shown that with high protein feeding there is at first a marked increase in N. retention, but that this persists only for a short time and that increased intake is followed by an increased excretion which is nearly but not quite proportional.

Protein is needed first of all to supply the nitrogenous waste of the cells of the body, one of the constant phenomena of life; secondly for growth; and lastly it may supply heat. The waste or "wear-and-tear-needs" of the infant, as compared with the needs of the adult, are not great. Growth according to Rubner is not in proportion to the protein intake and cannot be increased above natural limits by increasing the protein intake. The excess he believes is simply burned in the body in the place of carbohydrate and fat. The inference from his observations is that the protein requirements of the infants are relatively small and that if taken in excess of this minimal requirement the surplus can be used up in the place of other food elements.

Some experimental evidence has been brought forward which indicates that we may not continue to increase the protein in the food without incurring some risks; that the protein of cow's milk when given in considerable excess of the needs of the body may bring about disturbances of metabolism causing clinical symptoms of importance, even of gravity.

In a series of metabolism observations made four years ago at the Babies' Hospital, it was shown that if large amounts of protein of cow's milk were given without whey (*i.e.,* without carbohydrates) certain definite symptoms regularly followed—prostration, fever and a leukocytosis, which symptoms ceased immediately upon resuming the ordinary diet.

Observations in Lusk's laboratory by Howland and also by Murlin and Hoobler have shown that an increase in the amount of protein given caused an immediate and very marked increase in the general metabolism, and also that if fat and carbohydrates were not furnished in the food in sufficient amount, the increased metabolism caused an actual loss of these substances from the tissues of the body. In Hoobler's case there was observed diarrhea and a condition of semi-stupor, Symptoms like those mentioned in the foregoing observations have been seen, it is true, only when protein is given very much in excess of the amounts commonly employed. The cause of these symptoms is not yet understood and while the observations are by no means conclusive, they are strongly suggestive of possible harm which may result from very high protein feeding. The increase in the general metabolism from such feeding, and, under certain circumstances, the actual withdrawal of fat and carbohydrate from the body, may furnish an explanation of why it is so difficult to increase weight if fat and carbohydrate, but especially the latter, are much reduced.

Thus far we have considered the protein needs of the infant only from a quantitative standpoint, and until quite recent times this has been the chief subject of discussion. The only differences between proteins have been indicated by that somewhat vague term of "digestibility." The latest studies of the food proteins indicate that the amount of protein given is much less important than the nature of the protein furnished. We have learned from Abderhalden that our common food proteins are very complex substances, being made up of some sixteen or eighteen different amino-acids.

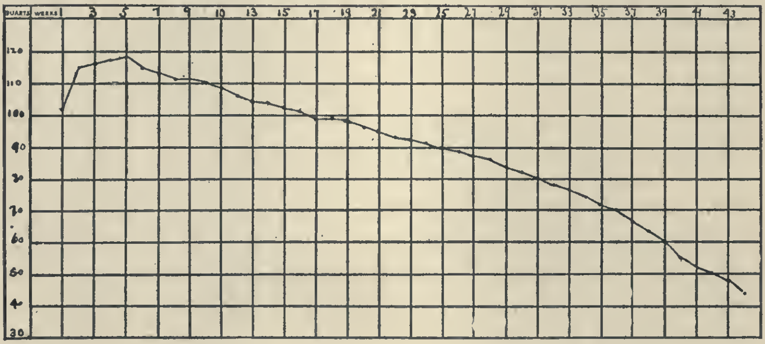

Fig. 1. Showing diminutions in daily yield of milk in quarts, by weeks, of 100 cows

Osborne and Mendel have for years been carrying on an extensive series of feeding experiments upon animals to determine the specific value of the different amino-acids in nutrition. They have shown that certain amino-acids are indispensable for growth; others are relatively unimportant. Thus if gliadin, a wheat protein, be the form of protein given to the animal, although the animal may maintain its weight, no growth occurs. But if to this, without increasing the total protein, a small amount of one of the amino-acids known as lysin is added, a gain in weight begins immediately and continues as long as lysin is administered; but it ceases at once when lysin is withheld and begins when it is again furnished to the animal. From many such experiments they have reached the conclusion that lysin is indispensable for growth; without it, no matter what amount of protein food is given, the most that the animal can do is to maintain itself in equilibrium. There are three other amino-acids of great importance, cystin, trytophan and glycocoll. It does not seem possible for normal nutrition to go on unless lysin, trytophan and cystin are furnished in the food; glycocoll alone, there is good reason for believing, can be produced in the body by synthesis.

Now as to the bearing of this on infant feeding. Animal proteins, as a rule, are relatively rich in those amino-acids which we will call the essential ones, while many vegetable proteins are very deficient in them. But again there is a wide difference in the amino-acid content of the different animal proteins. Lactalbumin is the protein which contains the essential ones in largest proportion. Casein, however, is notably deficient in at least one important one, cystin. Mendel says if the supply of casein is limited, the curve of growth is altered, not for lack of total protein, which may be entirely adequate, but for lack only of cystin, for as soon as this is added to the food, normal growth at once begins. Growth, therefore, is limited by the supply of cystin. The deficiencies of casein are ordinarily made good by the amino-acids of lactalbumin. And right here may I recall to your minds the fact that in woman's milk the amount of lactalbumin is twice the casein, while in cow's milk it is only one-sixth the casein? It is surely not an accident that woman's milk has relatively twelve times as much lactalbumin as has cow's milk.

Woman's milk supplies not only the amount of protein needed by the infant for the first eight or nine months of life, it furnishes what is more important, the essential amino-acids in sufficient quantity. There are good reasons for believing that nature has not intended cow's milk to nourish even the calf for a very long period. The maximum secretion of cow's milk is reached at the beginning of the second month, after which it steadily declines. Moreover, the calf at birth usually has eighteen teeth, indicating again his early capacity for digesting other food than milk and also his need of it. Now the secretion of woman's milk increases in quantity under normal conditions up to eight or nine months, and the human infant does not get his teeth until seven or eight months—a strong suggestion that up to this time other food is unnecessary for normal nutrition. But, in the case of infants who are artificially fed, conditions are different; although the defects of cow's milk have not been wholly understood, we have lately seen the great advantage of the earlier use of other articles of diet—fruit juices, beef juice, egg, broth and even fresh vegetables. Thus we have been unconsciously doing what the calf has been doing for a very long time—supplying the deficiencies of cow's milk.

Returning to the subject of casein, Osborne and Mendel have found that the gain in weight with 9 per cent. of the food solids in the form of casein was very low unless cystin was added, but if the casein was doubled or increased to 18 per cent., a normal rise in weight was seen. We have here, I believe, an important fact which sheds light on some of our failures and successes in infant feeding. We once thought that we were supplying the infant's protein needs when we gave as much protein in cow's milk as the protein in woman's milk. Evidently we were wrong. It now seems clear that some of our failures were not due to the fact that we were giving too much fat, but that we were not supplying in the protein given the amino-acids required for normal growth.

The success which has attended the use of formulas made from whole milk has not been entirely due to the fact that the fat disturbances have been avoided, but that in these formulas by greatly increasing the protein we have come much nearer supplying the infant's actual amino-acid needs for growth, especially in lysin and cystin. The excess of other protein food apparently is not injurious.

We have seen thus far (1) that the digestion of the protein of cow's milk is a much easier matter than was formerly supposed; (2) that while injury may without question be done by high protein feeding, this is very unlikely to occur, unless amounts much in excess of those commonly used in infant feeding are administered; (3) that in such amounts we have as yet neither clinical nor laboratory evidence to show that protein is harmful; (4) that although an infant receiving breast-milk takes rather less than 7 per cent. of his calories as protein, this cannot be taken as an exact criterion of how much protein should be administered when cow's milk is the food; (5) that the deficiency of cow's milk casein in certain essential amino-acids may be made up by giving an excess of this protein.

There remains for brief consideration the clinical use which may be made of these facts, not now in the feeding of healthy infants, but in the diet of those who are suffering from the most common forms of digestive disturbances—intolerance of fat or carbohydrates or both. The great advantages of high protein feeding and the extent to which proteins are borne we have only recently appreciated. That an infant of four or five months could easily tolerate a milk mixture containing as much as 3.5 or even 4 per cent. of protein has been to most of us a surprise, especially when the protein given is nearly all casein. In our experience, in acute intestinal disturbances it is the carbohydrates that are most frequently at fault, and sugars are even more badly borne than starches. Milk sugar seems then to cause more disturbance than any other form of carbohydrate. It is for such cases that Finkelstein's milk modification—best translated into English as protein milk—is so valuable. Its usefulness is seldom enhanced by preparing it from skimmed milk, but, in my experience, rather the contrary. For its relatively high fat is usually tolerated without difficulty when very low sugar is given. This preparation is to be regarded as a therapeutic agent, not a method of infant feeding, but it is one of the most valuable additions to our resources that has been made in recent years.

The newer facts regarding the proteins I believe are bound to have an important influence in our future study not only of the rôle of protein in feeding, but in putting much more clearly before our minds the fundamental protein requirements in nutrition. No longer must we be content to consider only the amount of total protein given, for it has been shown that this often is a matter of secondary importance. For the pediatrist there is opened up a new field of investigation in the problem of artificial feeding which seems to me to be full of promise.

14 West Fifty-fifth Street.

PRESENT OPINION AS TO THE RÔLE OF FAT IN INFANT FEEDING*

BY JOHN LOVETT MORSE, A.M., M.D.

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The fat in infants' food is chiefly in the form of neutral fat. The saliva has no action upon it. Saponification begins in the stomach, but the action of the gastric lipase is quickly stopped when the reaction of the gastric contents becomes acid. The amount of digestion of fat in the stomach is entirely unimportant. The fat is ensnared in the meshes of the casein curds and there is, therefore, very little opportunity for absorption in the stomach. This ensnaring of the fat probably also prevents the liberation of excessive amounts of fat at any one time in the intestines. Fat delays the emptying of the stomach.

The real digestion of fat takes place in the small intestine, where it is split into fatty acids and combines with the alkaline carbonates to form soaps. Fat is probably largely, if not entirely, absorbed in the form of soap. Neutral fat is not absorbed. Most of the fat which is absorbed goes into the thoracic duct and thence into the blood stream. The fate of a not inconsiderable portion of the absorbed fat is, however, at present not known. The absorption of fat is extremely good in health, whether the food is human or cow's milk. More than 90 per cent. of the fat ingested is usually absorbed and in some instances as much as 98 per cent.. About 10 per cent. of the fat is absorbed in the upper part of the small intestine, and the absorption is nearly complete at the ileocecal valve.

The greater part of the fat in the stools comes from the food, not from the intestinal secretions. During the early weeks of life the stools contain a very large amount of fat. After this time, from 14 per cent. to 25 per cent. of the dried stool is composed of fat. Under normal conditions, at least 75 per cent. of the fat in the stools is split into fatty acids and soaps. Because of the facts that the greater part of the fat in the stools is derived from the food and that under normal conditions, more than three-fourths of it is split, the microscopic examination of the stools gives valuable information as to the digestion and absorption of fat.

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* Read as a part of a Symposium on Modern Infant Feeding at the New York Academy of Medicine, Section on Pediatrics, November 11, 1915.

Little is known as to the significance of fatty acids and soaps. Fatty acids are irritating to the intestines, soaps are not. A loose, acid stool can often be changed to a "soap stool" by a relative increase in the amount of casein in the food, while an alkaline soap stool can be changed to an acid stool by a relative increase in the amount of carbohydrates. That is to say, whether the fat is in the form of fatty acids or soap depends chiefly on the reaction of the stool, which in turn depends on the relation of the food components to each other. The intestinal flora also changes with the change in the reaction. The absorption of fat in babies that are passing soap stools is less than when the stools are normal. (This raises the question as to why so many pediatricians are so anxious to get "soap stools.")

Increased peristalsis with consequent diarrhea results in an increased loss of fat in the stools. It makes no difference what is the cause of the diarrhea, whether it be an excess of fatty acids, an excess of carbohydrates or some parenteral infection.

The relation between the amount of fat in the food and the absorption of such salts as combine with fat would seem at first glance to be a very simple one. Such is not, however, the case. It seems probable that when there is a large amount of soap the absorption of calcium and magnesium is diminished. It would seem reasonable *a priori,* moreover, to suppose that when the fat in the food is increased beyond a certain point, there would be an increasing loss of mineral salts. This is apparently not the case, however, unless there is a fat diarrhea, because the data from metabolism experiments show that in the normal infant a high fat intake does not change the mineral composition of the stools. In chronic malnutrition, however, the output of salts in the feces is considerably raised by increasing the fat in the food.

In the chronic disturbances of nutrition, which are described under the names of marasmus, infantile atrophy and alimentary decomposition, there is in some instances a considerable diminution in the absorption of fat. In some instances, however, the percentage of absorption has been higher when large amounts of fat were given than when small amounts were given. In this condition the retention of the fat of human milk is greater than that of cow's milk. There is no evident explanation of this fact.

It is evident from the facts just cited that there is nothing in our present knowledge as to the digestion and metabolism of fat in infancy to justify the assumption, or even the supposition, that the normal infant cannot digest and utilize fat in reasonable amounts. In fact, all the evidence goes to show that it can. It is also evident that many of the ills that have been attributed to the fat in the food are really due to an excess of one of the other food elements or to an improper relation of the food elements to each other. It is equally evident that the conditions are not the same in infants suffering from disturbances of digestion or from certain serious disturbances of nutrition. In such abnormal infants the ability to digest, absorb and utilize fat is unquestionably diminished.

It is evident that there is no reason why normal infants should not take reasonable amounts of fat in their food. Is there any reason why they should take it? Good human milk, which is unquestionably the food on which infants thrive best, contains, on the average, from 3.5 per cent. to 4 per cent. of fat. It would seem as if this fact ought to indicate something as to the infant's need of fat in its food. There is no evident reason why the normal infant should not require as much fat in an artificial food as in its natural food. Investigation shows that it utilizes the fat of cow's milk as well as that of human milk. Clinical experience shows that it thrives on artificial foods containing approximately the same amount of fat as human milk. Nature provides a food rich in heat-producing substances and relatively low in tissue-building substances, that is, rich in fat and carbohydrate and relatively low in protein. This fact shows that considerable amounts of these heat-producing elements are essential for the well-being of the infant. It would seem from the results obtained when babies get a sufficient amount of good, human milk that the relation between the two heat-producing elements, fat and sugar, in human milk, is the proper one. Moreover, when normal babies are fed on artificial foods containing these elements in essentially the same relations as in human milk, they thrive. The functions of fat and carbohydrates, while both heat-producers, are, however, not exactly the same, the metabolic water formed from fat being much greater than that formed from carbohydrates. The caloric value of a gram of fat is 9.3, while that of a gram of sugar and starch is 4.1. Very considerable amounts of carbohydrate must be given, therefore, to make up for a deficiency of fat in the food in order to keep up its caloric value. If the amount of carbohydrate is increased beyond a certain point, carbohydrate indigestion is certain to develop. Fat and carbohydrate cannot, therefore, be used interchangeably beyond a certain point. There are, therefore, many good reasons why infants should take fat in their food.

There being no reason why the normal infant should not take fat in its food and many good reasons why it should, the next question is, how much should it take? As much as it needs to satisfy the caloric requirements which should be met by fat and not enough to overtax its digestive capacity for fat. How much is this? Nature has decided that in human milk it is from 3.5 per cent. to 4 per cent. My experience and that of many others has shown that after the first few weeks of life, this is the optimum amount for the artificial food for the normal infant. The average normal infant can not only take this amount of fat without injury, but needs it in order to thrive properly. Many infants will, of course, thrive on less, provided a sufficient amount of the other food elements is given to make up for the deficiency in fat, because the limits of tolerance for the various food elements are in the normal infant fortunately moderately elastic.

Relatively few babies will thrive continuously, however, on more than 4 per cent. of fat. More than this should not be given, except temporarily and for definite reasons. No one who knows anything about infant feeding advises or has, so far as I know, ever advised, giving more than this. Many babies have been made ill, however, as the result of having been given larger amounts and it is largely because of this improper use of fat that the prejudice has arisen in this country against the proper use of fat in infant feeding. Why have physicians given excessive amounts of fat? There are many reasons. Among them are the facts that many physicians have unintentionally or willfully disregarded the teachings of those who have known how to use fat properly; the erroneous idea, prevalent many years ago and long since discarded, that fat cannot do any harm to a baby; the knowledge of the fact that fat may act as a laxative and the ignorance of the fact that it may also constipate; the desire to make the baby gain in connection with the idea that fat, having a high caloric value, will make it gain faster than the other food elements; the ignorance of the fact that creams and top milks contain varying amounts of fat; the carelessness of physicians in directing mothers how to prepare their babies' foods; and finally the laziness of physicians, in that so many of them will not take the trouble to learn how to properly modify milk.

Another cause of the prejudice against the proper use of fat in infant feeding is the fact that physicians have failed to distinguish between normal and abnormal infants. What is proper, advisable and necessary in normal infants is improper, inadvisable and not only unnecessary, but harmful, in the abnormal. The arguments which justify the use of reasonable amounts of fat in the food of normal infants do not apply in the case of sick infants. It is self-evident that infants that have developed an intolerance for fat as the result of the excessive feeding of fat or of some chronic disturbance of nutrition cannot take without injury the amount of fat which normal infants need in order to thrive. It is equally self-evident that when there is an excessively acid condition of the intestinal contents, whatever its cause, the products of the decomposition of fat, which are acid, will make the condition worse and increase the symptoms. When considerable amounts of fat are given under these conditions, bad results will necessarily follow. These results ought not to be used, however, as an argument that reasonable amounts of fat should not be given to normal infants. They do not show this. They merely prove that the improper use of fat, as of the other food elements, does harm.

Much more might be said as to the use of fat in infant feeding. Many points such as the use of other forms of fat than that of milk, the homogenization of the fat and the relation of the fat to the other food elements, have not been touched upon. The importance of individualization in infant feeding, the present tendency to try to make all babies take the same food and the endeavors of certain enthusiasts to make a food "like human milk," all of which have a definite bearing in this connection, have not been taken up. Nevertheless, enough has been said, I think, to show in a general way what is the rôle of fat in infant feeding.

THE RÔLE OF SALTS IN INFANT FEEDING *

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It is my plan in this paper to report the more recent investigations in salt metabolism as they relate, first, to the connection between salt metabolism and the food elements—protein, carbohydrate and fats; second, to the low content of iron in cow's and woman's milk; third, to rickets; and fourth, to gain in weight.

Salts and Protein—The relationship between salts and proteins may be stated as follows: Nitrogen retention is largely dependent on mineral metabolism. The nitrogen circulating in the blood is loosely held by the tissues, but cannot remain thus loosely held for any length of time without being excreted, unless the salts are in sufficient quantity to make the nitrogen available for the building up of living protein. It has been found that for every gram of nitrogen about 1.7 gram of ash are retained. (Howland.)

Some interesting observations in confirmation of the above statement were made by Levene, Holt and Courtney at the Babies' Hospital Laboratory on the effects of high protein feedings and salt metabolism. In certain infants fed on high protein, up to 6 per cent., which necessarily was accompanied by a high salt intake, there was a rise in mineral balance.

This may explain, in part, the favorable effect of protein milk in certain diseased conditions of the intestinal tract accompanied by diarrhea. In the cases at the Babies' Hospital who did well on protein milk there was an accompanying large salt retention. This helps to compensate for the mineral loss due to the diarrhea. There is no conclusive experimental work to show that either a decided increase or decided decrease in nitrogen intake influences calcium addition. (Orgler.)

To sum up, a large intake of protein is accompanied by a large retention of salts, if the intake of salts is also high.

Carbohydrates and Salts—The influence of carbohydrates on salt retention is apparently an indirect one. Carbohydrates increase the water retention. With an increase in water retention, there is an accompanying salt retention. Lust has demonstrated that the water content of the blood is increased in infants fed with an excess of carbohydrates. Weigert and Steinitz connect the diminished immunity in infants fed with excessive carbohydrates to the increased retention of water in the tissue.

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* Read as part of a Symposium on Modern Infant Feeding at the New York Academy of Medicine, Section on Pediatrics, November 11, 1915.

In all probability the marked gain in weight which is seen in high carbohydrate feedings is in part explained by the water retention. This gain in weight is by no means an index of improved nutrition, and it may lead to false interpretations as to the condition of the infant. It invariably satisfies the parents.

A great danger, however, lurks in excessive carbohydrate feedings, namely, the occurrence of sudden diarrhea with the accompanying disturbance in the mineral equilibrium.

In children suffering from marasmus, the carbohydrate may have a deleterious effect on the mineral balance. Blauberg's analysis of the total mineral metabolism in a marasmic child on a cereal diet showed a negative balance in the retention of calcium and magnesium.

Mention has just been made of diarrhea as one of the harmful results of excessive carbohydrate feeding. The effects of a diarrhea on mineral metabolism are, however, not specifically related to excessive carbohydrate feeding, but are manifest whatever may be the cause of the diarrhea. Holt, Courtney and Fales have shown that with a diarrhea there is a loss of sodium and potassium. This loss of the alkalies varies closely with the amount of water in the stools. There is, however, some compensation for this loss by a lower excretion of these salts in the urine. If the loss of these alkalies is excessive there follows the phenomena associated with de-alkalinization of the tissues—rapid loss of weight, prostration, acidosis, etc.

Fat and Salts—The effect of fat as studied by many German investigators may be stated as follows: In a food rich in fats there is associated an increased ammonia excretion (Keller and Van Bergh) which is compensated for by the alkali intake. If this intake is inadequate, alkali is withdrawn from those tissues which can most readily release it. These tissues are the skin and muscles. (Orgler.)

In observations made in the chemical laboratory of the Babies' Hospital, it was found that there is in stools which have a high calcium content also a high phosphate. This would indicate that there is adequate calcium to combine to form soaps and also to take care of the phosphoric acid. It has also been observed that in infants with soapy stools the calcium loss, as a rule, is not sufficient to cause a negative balance. The molecular weights of the fatty acids are very high, and, accordingly, only a small weight of calcium is required to hold a relatively large amount of fatty acids. (1 to 10.)

This observation is not in accord with the conclusions of many German investigators, who regard the presence of soapy stools as an indication of abnormal digestion involving excessive alkali withdrawal. This has not been found to be the case in the experiments conducted at the laboratory of the Babies' Hospital. In the cases which were observed there, it was found that the only way in which fat affected the salt metabolism unfavorably was in diarrhea in which was seen a great withdrawal of all salts, especially potassium and sodium. Even here this result is due largely to an increased peristalsis.

The effect of a high fat intake on calcium retention has received especial study. According to Orgler this effect is so decided that one may diminish the calcium intake and at the same time raise the calcium retention by lowering the amount of fat in the food. There is, however, no uniformity of opinion as to the effects of large amounts of fat on calcium retention. In some infants considerable amounts of fat decisively affect the calcium addition with a resulting negative calcium balance; in other infants there are no ill effects on the calcium metabolism of large amounts of fat in the food.

It may be said in general, that in healthy infants the addition of large amounts of fat to the food disturbs the mineral metabolism in only a slight degree. If, however, high fat feedings are persisted in long enough, disturbances may eventually result in which there is a de-alkalinization of the tissues of serious import. Decisively harmful effects of fat on salt metabolism are manifest in disease of the intestinal tract accompanied by diarrhea.

The practical lesson of these investigations for infant feeding seems to be to give moderate percentages of fat, such, for example, as are obtained by the dilutions of whole milk. This will avoid the dangers which may lurk in high fat feedings.

Iron—The individual salts of cow's milk are present in larger quantities than the corresponding salts of woman's milk with the single exception of iron. 1,000 grams of woman's milk contains from 1 to 4 mg. of the oxide of iron; 1,000 grams of cow's milk contains 0.4 to 0.7 mg. After cow's milk is diluted the iron content in the resulting dilution is reduced to a negligible quantity. It is necessary for the child's nutrition to make up this iron deficit when the child is fed on cow's milk. The anemia which often accompanies prolonged milk feeding is familiar to everyone. At least one explanation of this is found in the lower iron content of milk formulæ. It is desirable to make up this loss in iron. There are two ways to accomplish this: By administering iron directly or by supplying the iron by adding to the diet articles of food containing iron. The latter is the more rational way to meet this contingency. Before the more accurate methods of infant feeding became established, food from the table was fed to infants. This practice has not been entirely abandoned. Perhaps there is some practical wisdom in this careless mode of infant feeding, which scientific methods have failed to recognize. It is my belief that the nutrition of many children has suffered from the failure to supply early enough an adequate quantity of iron, as well as other salts, to the growing infant. The age at which this deficit in iron manifests itself is after the sixth or seventh month. This period corresponds with the eruption of the teeth. After six or seven months the loss in iron may be made up by giving other foods besides milk. If these foods are given in small quantities at first, and gradually increased, the adaptation to the new articles of diet may be accomplished without harm to the infant. Some of the foods which may supply the iron, as well as other salts, are yolk of egg, cereals, green vegetables and cooked fruit. Properly cooked and properly fed, I believe these foods may be given without damage to the digestion.

Bery has shown that green vegetables furnish calcium in one of the best forms for absorption, and that if properly administered they serve a valuable function in the mineral nutrition of the child. This is especially true of spinach. Besides furnishing iron to the growing organism, the feeding of green vegetables also especially favors calcium retention. It has been my practice for some time to feed eggs and green vegetables to healthy children under a year, and I believe that it has resulted in producing more vigorous infants. Their fontanels have closed earlier, they have walked earlier, and they have been more active. In a word, they have seemed to be stronger, healthier infants than those who have been fed milk almost exclusively during the first year. I believe that this improvement in nutrition is in part due to the increased salt retention, especially as it is related to iron and calcium.

Rickets—The total ash of normal bones is about 65 per cent.; in rickets it may fall to 25 per cent. The bones of rachitic children contain less calcium and phosphoric acid and an increased amount of water. The calcium content of other organs, however, is not disturbed in rickets. (Brubacher, Stoltzner, Aron and Sabaeur.) What, therefore, is the daily calcium need of an infant if he will remain free from rickets? This question cannot be answered categorically. The calcium needs will vary with different infants. A long infant will require more than a short one; a rapidly growing one than a slowly growing one, etc. Taking all the varying factors into consideration, we may consider an average deposition of 0.17 to 0.18 grams of calcium in the tissues a day as a fair estimate. (Schabad.) If the lowest limits of the calcium addition in a healthy child are 0.12 to 0.13 grams, then it might be supposed that if a child absorbs less than this, rickets would result. This, however, does not prove invariably to be the case. It has been shown that a child may remain free from rickets on an addition of 0.05 grams of calcium daily and that rickets may result where the calcium intake is adequate. However, metabolism experiments on rachitic children have shown that in the majority of instances their calcium addition is below the normal. The answer to the question, What is the calcium need of an infant to remain free from rickets? cannot be stated, since the cause of rickets seem to lie in a failure to make use of the calcium which is ingested and not in an inadequate supply of calcium in the food. (Orgler.) There is as yet no explanation of this failure to utilize the available calcium.

Salts and Gain in Weight—The salts are an essential element of the food in the determination of a gain in weight. A diet without the normal salts, but of adequate calories, will be invariably accompanied by a rapid loss in weight. This loss of weight can only be explained by a loss to the organism of water.

The sodium salts (chiefly sodium chloride) are those most intimately associated with the retention of water in the organism. Sodium bicarbonate, phosphate and bromide share in this effect. The potassium and calcium salts, on the other hand, for the most part, have the effect of withdrawing water from the organism. (Schloss, Langstein and Meyer.) This effect of the salts on water retention is only operative if an adequate amount of water is ingested. For an infant of four weeks, each kilogram of body weight requires 142 grams of water; of six months, 122 grams; the adult requires 35 grams of water per kilogram of body weight.

There is also a close relationship between carbohydrates and water retention. Weigert's experiments on animals have shown that there is a greatly increased retention of water in animals fed on carbohydrates. There are several theories to explain this effect, which will not be discussed in this paper.

44 East Sixty-third Street.

TETANUS NEONATORUM—Within a very recent period several cases of this supposedly incurable condition have responded successfully to treatment, which consisted of or included the use of magnesium sulphate. In the Deutsch. Med. Woch. for April 22d we find a belated account of a discussion on this affection which took place just before the breaking out of the war. Czerny laid stress upon the fact that tetanus bacilli are not found in umbilical infection of the newly born, but was set right on this point by Baginsky, who remarked that Kitasato had found the bacilli in pus from the navel. Finkelstein stated that trismus nascentium, so-called, was by no means always a tetanus and was often due to skull traumatisms and encephalitis. Further, the geographical pathology has been neglected. Tetanus (infectious) of the newly born is rare in Germany but common in Roumania. Negative bacillary finds signify but little in the presence of positive finds of other sorts. Czerny, in alluding to cases in the tropics, adds that umbilical antisepsis has not prevented tetanus. He has been on the hunt for tetanus germs in the navel for twenty-two years and has yet to find one. Tetanus of the newly born is not due to infection in the ordinary sense, but belongs under the nervous affections. The consensus of opinion appeared to be that this question should be left open. The influence of magnesium in such a neurosis could be readily understood. None of those who discussed the paper threw any light on the alleged neurotic tetanus of the newly born, with reference to its intimate nature, and they left undetermined the question of its bacterial origin.—*Medical Record.*

A BRIEF RESUMÉ OF THE RÔLE OF CARBOHYDRATES IN INFANT FEEDING

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The soluble carbohydrates usually given as foods for infants are: milk sugar, cane sugar, malt sugar, and combinations of malt sugar and dextrin. As all of these are converted by digestion into dextrose, they are to a certain degree interchangeable. Lactose would seem to have the most general endorsement as the chief carbohydrate for the first year. In this we are following nature, as lactose is found in milk. Its slower absorption and favoring influence on the normal intestinal flora, and the fact that it does not ferment with the yeasts found in the stomach, as do both maltose and cane sugar, presents positive advantages over the other two. With a diseased intestinal tract it would seem that cane sugar and dextri-maltose preparations, being more easily absorbed, are preferable. Dextri-maltose, having a higher absorption tolerance than the other sugars, is less likely to cause intestinal disturbances when large amounts of it are given. It is certain that there is no positive advantage to be gained by giving higher than 7 per cent. of any of the sugars. The results of high sugar feeding are: vomiting, flatulence and colic, and loose green or yellowish-green stools. When vomiting occurs, and it has been decided that the vomiting is due to high sugars, it is best to cut down the sugar at least one-half, and only milk sugar should be used. Flatulence and diarrhea, when they occur from sugar, should be treated by a sugar reduction, and a changing over from milk sugar to either cane or malt sugar, both of which are more easily absorbed thus increasing the chance of speedy recovery from the diarrhea. Carbohydrates in the form of the various sugars furnish fuel and energy to the infant's economy. The large percentage of sugar in breast milk seems to prove that carbohydrates in some form are very essential. When they are lacking, pathologic changes in the infant's metabolism occurs.

In regard to the absorption of sugars it is certain that the salivary enzyme has a definite effect on starches in changing them to sugars, and very little effect on sugars themselves. There is little absorption of sugar in the stomach.

Cane sugar and milk sugar are inverted in the small intestine by invertase and lactase, the first being changed to dextrose and levulose, the second to dextrose and galactose. Starch is broken down to maltose and dextrin and subsequently inverted to dextrose. The time required for the digestion of starch insures a slower and more complete absorption. The assimilation limit of sugars varies with a great many conditions, but so far as the different forms of carbohydrates are concerned it is lowest for milk sugar (120 grams) and cane sugar (175 grams); and highest for levulose (200 grams) and dextrose (250 grams). The simple sugars dialyze easily and are probably absorbed into the blood by a simple process of diffusion, or directly through the epithelial cells in the wall of the intestine itself, and from thence into the blood. From the blood the dextrose enters the portal vein and is stored as glycogen in the liver. The amount of this sugar in the blood is kept quite constant, being about 0.15 per cent. So far as the carbohydrates escape absorption as sugar (dextrose), they are liable to undergo acid fermentation from the bacteria always present in the intestines. As a result, there may be produced acetic acid, lactic acid, butyric acid, succinic acid, carbon dioxide, alcohol, hydrogen, etc. This fermentation probably occurs to some extent in the small intestine normally. Under less normal conditions, such as an excess of sugars in the diet, or deficient absorption, the large production of acids may lead to irritation of the intestines with resulting diarrhea.

Influence of Carbohydrates on Nitrogen Retention—Nitrogen retention is necessary to all babies in that it forms the protein material essential for growth. Even when the ingested food constituents are deficient in the needed caloric values, the baby retains nitrogen and burns the stored-up glycogen and fat to compensate for the lack of energy supplied in the food. In other words, he grows at the expense of his general nutrition. The nitrogen retention naturally is dependent to a large degree on the amount of protein food taken in. To a lesser degree the carbohydrates also have their influence on this retention. When a baby is receiving enough food to meet all requirements, the addition of carbohydrates causes an increase in the nitrogen retention. This is due to the fact that the added carbohydrates are utilized for fuel and energy, and, accordingly, there is a sparing of nitrogen. With this nitrogen retention there is a retention of water and a corresponding increase in weight, a thing so often noticed following feedings of the proprietary foods high in sugar. When large amounts of carbohydrates are given over a prolonged period disturbances of digestion follow, a negative nitrogen balance being the result. Loss of nitrogen then occurs in the feces and urine, the latter taking care of most of the nitrogen. Increased peristalsis follows, and large amounts of fat, protein and ash are eliminated. The loss of weight and prostration following this is marked. Starches act in the same manner as the other carbohydrates, but go through one more step in their conversion into a monosaccharid. Owing to this increase in the absorption time of starches, there is less chance in upsetting the nitrogen balance by giving them than there would be by giving sugars.

Relationship of Carbohydrates to Fat Metabolism—In a normal intestine the carbohydrates have a negligible influence upon the absorption of fat. However, when there have been prolonged feedings with high fat mixtures of milk, with a resulting intolerance to fat, low fat feedings are indicated, the consequence being that the burden of energy production is thrown on the carbohydrates. These accordingly must be given in large amounts to counterbalance the loss necessitated by the fat reduction. When fermentation and nutritional disturbances follow this excess of sugars, the underlying cause is in doubt, as to whether the fatty acids in the stools are formed from the sugars or from the fats. Whether these disturbances are caused directly by products of sugar disintegration or indirectly by action on the growth of bacteria in the intestines, the results are the same; fat is poorly absorbed, there is loss of sodium and potassium salts as a result of excessive intestinal secretions, and an excessive excretion of ammonia in the urine.

Carbohydrate Relationship to Salts—To Finkelstein is due the theory that the sugar and salts of cow's milk, as they exist in whey, are the cause of almost all the disturbances of nutrition in infancy. He pointed out that the foods rich in whey caused the most unfavorable symptoms, and that these were only cured by a diet in which the whey had been eliminated. Meyer's experiments, in which he fed to the same child human whey, cow's fat and cow's casein, and later cow's whey, human fat and human casein seemed to prove this contention. When cow's whey was given there was a loss of weight and marked diarrhea. These conclusions have been criticized in that the proportion of protein, fat and calcium in cow's whey was non-productive of formed stools, while when human whey was given the proportion of the above constituents in the curd was sufficient to produce formed stools. Finkelstein and Meyer, supported by Schaps, later came to the conclusion that sugars and salts had a definite toxic and pyrogenic action. Dilute solutions of lactose and sodium chlorid injected subcutaneously produced a definite temperature rise from four to six hours after the injection. The temperature became normal in about twenty-four hours. It has become evident that this rise of temperature follows only when the intestinal wall has become diseased. Even when large amounts of sugars and salts are given by mouth up to the point of tolerance, there has been no resultant fever in normal children. About 50 per cent. of sick children react, the temperature being not unusually high, and always somewhat delayed. As to which sugar causes the largest percentage of reactions, there seems to be no difference in the result, fever being found as often after glucose and saccharose as after lactose and maltose. The results simply point out the long recognized fact that concentrated sugar or salt solutions have a bad effect on sick infants. These results, however, have varied with different experimenters, and their relationship to infant feeding is not fully established. There has yet to be proved the statement that sugars and salts are definitely responsible for the fever and the constitutional sequelæ. Schlutz (American Journal of Diseases of Children, Vol. III., page 95) comes to the same conclusions:

(1) Lactose if given intravenously, subcutaneously or orally possesses no distinct pyrogenic effect, no matter in what concentration or amount it is given.

(2) It does possess a definite though not a pronounced influence on the temperature if it is given subcutaneously or orally to a child with a diseased intestinal tract in combination with a medium containing a sodium salt.

Diabetes Mellitus and Acidosis—In infancy acidosis resulting from an excessive production of acids occurs in diabetes, in recurrent vomiting, and following excessively high fat feedings. Normally, acids are always being formed in the body and means are being taken to neutralize and to eliminate them. The important constituents (Howland) of the blood influencing the regulation of its reaction are sodium bicarbonate, occurring chiefly in the plasma; the acid and alkaline phosphates of potassium, found almost entirely in the red blood cells; and the proteids. Acids, whether formed in the body, or introduced from outside, displace the sodium-bicarbonate and set free carbon dioxide. This excess is removed by increased pulmonary ventilation, leaving a neutral salt to be removed by the kidneys. The second means of excretion is by way of the kidneys, which have the capacity to excrete an acid urine from a nearly neutral blood. The third method to counteract acidity is by means of the proteids, which afford an increased production of ammonia which attaches itself to the acid, and is thus prevented from passing over to urea. This neutralization of the acid by the combination of ammonia has its limits, as only a certain portion of the nitrogen arising from the breaking down of proteid can be set free for disposal as ammonia. If the production of acid continues with undiminished vigor, then the abnormal amount of acid must be neutralized by the fixed alkalies of the tissues. In childhood the amount of acid which can be taken care of is enormous. Even with large amounts there are no disturbances in the blood reaction and no effect on respiration. The rôle of the carbohydrates in this condition is that of being fat sparers, thus preventing the formation of acids. It is a fact (Von Noorden, "Disorders of Metabolism and Nutrition") that the simultaneous consumption of carbohydrates either prevents the formation of acetone bodies from fatty acids, or promotes their immediate destruction to such an extent that hardly a trace of them is left. Thus carbohydrates are indicated in severe conditions of acidosis and are given in conjunction with sodium bicarbonate. The acetone bodies, however, are frequently found in the urine without any clinical significance, and, on the other hand, there might be a severe acidosis present with no acetone bodies in the urine. In a number of cases diabetes has followed the ingestion of large quantities of sugars for a long time. Temporary glycosuria is very common in infancy and always must be ruled out in making a diagnosis of diabetes. This condition quickly clears up when the amount of sugar given is diminished. Diabetes as a rule is insidious. After months or years the carbohydrate tolerance fails. This is often induced by some lapse in diet, or oftener by an intercurrent febrile disease (tonsillitis, influenza, diphtheria, etc.). A period of a few months, often only a few weeks, may elapse between a tolerance of 100 grams of bread, and the complete development of a severe type of glycosuria, no longer modified by the withdrawal of carbohydrates. This rapidly passes on to the condition of acidosis if not treated. The quantity of urine is vastly increased, and contains ammonia and the acetone bodies. This condition is comparable to the relative acidosis which follows an acute disturbance of the digestion as a result of an excess of fat in the food. When diarrhea results, there is not only an excessive loss of fat in the stools, but also an excessive loss of alkaline salts, especially sodium. When this loss of alkaline salts is excessive, the result is a condition of true acidosis, fever, loss of weight, prostration, coma and death.

103 East Eighty-sixth Street.

Measles in Young Infants—Winter (Jahrb. für Kinderhk., Berlin, June, 1915, Vol. XXXI., No. 6, pp. 465-562) has compiled a number of cases from the literature in which the mother and infant developed measles together a few days after its birth, the infection having apparently befallen both while the child was still in the uterus. In Ballantyne's case the measles seemed to have been responsible for the premature delivery, and the child presented the typical eruption when born. In contrast to these experiences, Winter has been unable to find records of any cases of extrauterine acquired measles in infants less than five months old except in an account of an epidemic in Ireland, and this does not state the exact age of the infants, so that in some or all of the cases the infection might have been intrauterine. Sperk asserts of measles that it occurs only rarely in infants from one to three months old; between the third and fifth months in about 50 per cent., and declares that all exposed infants from six to twelve months old develop measles. These facts render interesting Winter's report of a measles eruption developing in 2 infants at the sixteenth and eighteenth days of life. There had been prodromal symptoms the day previous in both cases. The mother of the youngest babe had developed measles just one day before, but in the second case the mother did not have measles. Winter adds that as the incubation period of measles is generally accepted as from thirteen to sixteen days, the children must have become infected the first and third days after birth.—*Journal of American Medical Association.*

MALT SOUP

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It is not the intention of this paper to contribute anything new in the way of infant feeding, but to give a review of the history, the rational justification and the value of the so-called malt soup.

HISTORY AND KELLER'S HYPOTHESES

While we look to Liebig as the originator of malt soup, and to Keller as the elaborator who put the food on a sound scientific basis, we find that LeRoy,[1] in 1805, advised for sick children a decoction of malt with quite fresh milk mixed with dried wheat meal. However, feeding of this nature seems to have been forgotten until 1865, when Justus von Liebig[2] published his monograph.

Liebig apparently reasoned out a food from a careful study of calorific needs and his knowledge of animal feeding. He showed his faith by using the malt soup first on a member of his own family. His contribution does not speak of feeding sick children, and he seems to have applied it only as a method for well children. He does not explain why he uses malt sugar. The food he advised was used with much success by himself, and others, and for years was written about by many who praised or condemned it. His monograph was published several times, and in 1847 was edited under the same cover with articles by Hecker,[3] Walther and Herman von Liebig. Herman von Liebig[4, 5] was quite enthusiastic, and in one of his papers makes the statement that half the children who die from digestive disturbances through improper food could be saved through the use of malt soup.

The different ingredients of the malt-soup mixture had been used at different times by various men interested in infant feeding. In 1853, Ploss[6] speaks of the advantage of adding an alkali when the stools are sour, when there is a sour odor to the breath, and in the vomiting of breast-fed infants. With the exception of LeRoy,[1] Ploss seems also to have been the first man to mention the use of a malt preparation as a food for well and sick children. In 1860, Vogel,[7] and in 1863, von den Busch[8] speak of the use of alkali to diminish the curd formation.

After the time of Liebig many articles on malt soup appeared, and the method of feeding was mentioned in most text-books. In a discussion at a session of the Paris Imperial Academy of Medicine, Guibourt[9] proposed that a commission be appointed to investigate the subject. In 1867 Ferber[10] reported the good results of malt soup in the case of his own child, and several other children. The generalized use of malt soup is shown by articles appearing in all languages. In Spain Nevett[11] exclaims against its use. Hauner[12] did not approve of it, and said it gave no better results than feeding zweibach, arrowroot and ricemeal. It was defended by von Liebig, von Pfeufer[13] and Ullersperger.[14] Herzog and Schiller,[15] Bassfreund[16] and Holst[17] commented favorably on its use, and considered that it formed a new epoch in infant feeding, performing especially good offices in sick and premature children. Poppel[18] considered that the malt soup was no better food for the newborn than suitable dilutions of cow's milk; that in older children it was an excellent preparation; and that in digestive disorders it was to be replaced by no other food. After 1870, although malt soup was much commented on, no important work on the subject appeared until Keller's[19] monograph in 1898.

From his clinical observation and his metabolic investigation, Keller comes to interesting and sound hypotheses which may be stated essentially as follows: In infants suffering from all forms of enteritis there is an increased elimination of ammonia, caused by an increased formation and elimination of acid metabolic products. The influence of food on ammonia excretion is clear. Fat (not albumin or sugar) is the food which influences formation of acids. These conclusions of Keller have since been confirmed by Vogt,[20] who found in acute nourishment disturbances, increased ammonia and allied nitrogen-containing substances. In chronic disturbances of nourishment the ammonia coefficient remains unchanged in some instances, but in others, especially in intolerance for milk-fat, it is distinctly increased.

Keller maintains that besides the increased formation of acids the lessened capacity of the organism for oxidation of acids plays an important rôle. Moreover, the quantity of fixed alkali in the urine is increased. The increased formation and excretion of acids (which we diagnose from the increased ammonia excretion in the urine) causes a loss to the organism in fixed alkali. As a consequence, the acids already in the intestine combine with the alkali, the last being withdrawn from the tissue.

Alkali, therefore, must be added to the food because in acid intoxication the alkali is withdrawn from the tissue to combine with the acid, and must be replaced. In addition, the acids unconsumed in the organism must be neutralized. Potassium carbonate is used because it is the alkali of food—human milk contains it in larger percentage than it does other salts—and because potassium is found in the solid parts of the human body, and is probably the alkali that combines with the acid in acid intoxication.

Protein should be added in the smallest amount compatible with protein needs. Milk sugar exercises a deleterious effect on the absorption of cow's milk nitrogenous bodies.

Fat prevents a loss of albumin, but it causes acids to be formed if pushed beyond the limit of assimilation, which is low in children suffering from enteritis.

Maltose is better tolerated and causes less disturbance. More important, however, is the fact that maltose does not affect ammonia elimination, whereas the ammonia elimination is increased with other sugars.

Starch, Keller says, is necessary clinically. The exact reason he does not know. He says it is not improbable that the action is mechanical, and protective to the intestinal wall from irritative products.

Therefore, a child with enteritis requires a food rich in alkali, low in fat and albumin, and with carbohydrate in the form of maltose.

FURTHER JUSTIFICATION

We have, then, in Keller's contribution sufficient explanation and justification for the use of the various ingredients which go to make up malt soup, with the exception, perhaps, of starch. Since Keller's time there has been much of interest written about the use of malt soup, and, although it would be impossible to cover all of this, certain experiments and experiences may be noted with profit.

We have learned that carbohydrates, such as starches and sugars, are eventually absorbed into the blood as simple sugars, chiefly dextrose, but probably also some levulose and galactose, the process being the hydrolysis of a polysaccharid to a monosaccharid. This means that in digestion all sugars reach the stage of maltose. Furthermore,[21] it has been shown that malt sugar is at least twice as stimulating as either cane sugar or milk sugar to the gastric secretion, and is less[22] liable to fermentation than other sugars. These facts add more reason for the use of malt in infant food preparations.

In regard to the use of starch we have seen that for many years it has been recognized that this form of carbohydrate is useful, and at times essential in the infant's dietary. We no longer hesitate to give it to young babies. Hess[23] has demonstrated the presence of amylose in the pancreatic secretion of the newborn. Kerley, Campbell and Mason[24] have shown, by examination of stools, that about 70 per cent. of infants have good starch digestion; even those under two weeks of age. Also we know clinically that young infants can take and digest boiled starch; and that starch in proper dosage is not injurious to the infant's economy. I have repeatedly tested the stools of infants who were given starch, and can confirm the experience of others.

Southworth,[25] in an excellent article on the influence of starch on infant digestion, brings out these points: Starch raises slightly the calories in food mixtures; it prevents mechanically the formation of large, tough curds; it exerts a protective action against the irritative effects of moderately large amounts of sugar and of fat; as the digestion of carbohydrate proceeds more favorably in an alkaline medium, starch, which does not readily undergo acid fermentation, is favorable to carbohydrate digestion; the slower conversion of starch spreads the process of digestion over a greater length of the intestine.

These facts teach us in some degree why starch is beneficial and necessary in malt soup.

THE METHOD OF PREPARATION

The malt extracts on the market,* to which have been added potassium carbonate in proper percentage, are very convenient in making malt soup. However, they are quite expensive if one is using large quantities. In the Children's Hospital we have pursued the plan (also used elsewhere) of using the non-diastatic extract of malt supplied by a local baker. To this we add potassium carbonate in the proportion of 218 grains to the quart of extract after heating. The addition of alkali, besides serving the purposes brought out by Keller, has two other uses. It further inhibits any diastatic action which may be remaining in the malt extract, and it neutralizes the small amount of acidity which is present in most malt extracts.

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* There are several such preparations, such as Loeflund's, Borcherdt's and the Maltine Company's extract. The preparation used at the Children's Hospital is procured from Freihofer. The malt extract used should be nondiastatic because unconverted starch is a necessary addition to malt soup. Diastatic action may be arrested in Malt Extract by heating to 165 degrees F. for two hours, or to 200 degrees F. for fifteen minutes.

In the preparation of the soup itself, the amount of flour ordered should be mixed with a small amount of water to make a paste, the rest of the water ordered is added, and this is boiled for twenty minutes. Then the amount of malt extract ordered is mixed with this starch and water solution, constantly stirring. The milk ordered should then be added and the whole brought to a boil again. Water is added to bring up the amount lost in boiling.

Most authorities have modified the strength of the ingredients of malt soup in some way. In our own work we have made several different formulas which have been found convenient in increasing the percentages. These, with the *approximate* percentages of fat, carbohydrate, and protein are given below:—

Formula A—
½ ounce wheat flour
10 ounces skimmed milk
10 ounces water
1 ounce malt extract

Fat 0.2 per cent.; carbohydrate, 7.5 per cent. (of which 2 per cent. is starch); proteid, 2.2 per cent.

Formula B—
½ ounce wheat flour
5 ounces skimmed milk
5 ounces whole milk
10 ounces water
1 ounce malt extract

Fat, 1 per cent.; carbohydrate, 7.5 per cent. (of which 2 per cent. is starch); protein, 2.2 per cent.

Formula C—
½ ounce wheat flour
10 ounces whole milk
10 ounces water
1 ounce malt extract

Fat 2 per cent.; carbohydrate, 7.5 per cent. (of which 2 per cent. is starch); protein, 2.2 per cent.

Formula D—
1 ounce wheat flour
10 ounces whole milk
10 ounces water
1½ ounces malt extract

Fat, 2 per cent.; carbohydrate, 11 per cent. (of which 3.8 per cent. is starch); protein, 2.6 per cent.

Formula E—
1½ ounces wheat flour
10 ounces whole milk
10 ounces water
1¾ ounces malt extract

Fat, 2 per cent.; carbohydrate, 14 per cent. (of which 5.7 per cent. is starch); protein, 2.9 per cent.

NOTE: These formulas made with any extract of malt would give about the same percentages. Most malt extracts have about 50 to 70 per cent. of maltose, 5 to 15 per cent. of dextrin, 5 to 12 per cent. soluble proteids, 20 to 25 per cent. water, and small amounts of phosphoric acid, lactic acid, peptones, etc. The malt extract used should be non-diastatic or feebly diastatic. Barley flour may be used instead of wheat flour. Ordinary wheat flour contains about 75 per cent. of starch, 8 per cent. of protein, and 1 to 2 per cent. of fat. Barley flour contains about 73 per cent. of starch, 10 per cent. of protein and 2 per cent. of fat. Wheat flour is best because[26] the combination of wheat flour and malt extract is least apt to ferment and produces the smallest amount of acids.

INDICATIONS FOR FEEDING MALT SOUP

As Keller admits, malt soup is by no means a universal panacea to be used in all kinds of cases, although it is useful in several forms of food disturbance. The typical case in which this feeding is of greatest value is in that of the so-called weight disturbance, the child who, on reasonable amounts of fat, sugar and protein cannot be made to gain, and who reacts unfavorably or paradoxically when the food elements are increased, *i.e.,* who shows vomiting, bad stools, or a decrease in weight. These patients usually have a high tolerance for carbohydrate, and will take, and thrive on, malt soup. In this way, owing to the favorable influence on metabolism, they can also take larger amounts of fat and protein.

The patients should be started on one of the weaker formulas, and increased as rapidly as possible. This, of course, should be preceded by a preliminary cleansing of the gastrointestinal tract—starvation, purgation, irrigation. A case which does well will have no vomiting; two to four rather large, brown, smooth stools a day, and will gain weight steadily. If the baby suffers from vomiting which is not controlled by limiting the amount, or reducing the strength of the formula, has loose stools containing mucus and a blue starch reaction to iodin, he will not gain weight, and after a fair trial of a few days should be taken off this form of feeding.

Babies under four months, premature babies, vomiting cases, cases with diarrhea and considerable mucus in stools, in our experience have not, as a rule, done well on malt soup. To these there are exceptions, as some of the cases to be detailed show.

In changing from malt soup to ordinary milk mixtures one must expect an initial loss of weight because of the removal of the large percentage of carbohydrate. The most satisfactory procedure is to gradually add a feeding or two a day of a milk mixture having a somewhat lower percentage of fat and protein than the malt-soup mixture, with a carbohydrate raised to 7 per cent. by the addition of dextro-maltose and a barley-water diluent. In this way the number of malt-soup feedings can be slowly reduced. There is no objection to keeping babies on malt soup for several weeks.

MALT SOUP STOOLS

A word about the stools. Owing to the large amount of carbohydrate, the child getting malt soup usually has several stools a day, although more than four should not occur if the patient is doing well. They are somewhat bulky and firm, and dark brown in color. Mucus should not be present. The stools may at times, however, show a trace of mucus, and yet the patient do well. At least once every day a test for starch should be made. This is easily done by dropping a weak solution of iodin on the stool, and observing whether a blue reaction occurs.

CONCLUSIONS

(1) Malt soup is a rational food.
(2) Malt soup is indicated in cases of weight disturbance.
(3) Malt soup is usually contraindicated in very young

babies, in children who have poor starch digestion, in vomiting cases, in diarrheal cases—but even here sometimes it should be given a trial.

EXAMPLES OF FAVORABLE CASES

CASE 1. Age five and one-half months. On admission had pneumonia. Had been breast-fed for two months, and since then on cow's milk mixtures. After convalescence from his pneumonia he was on milk-mixtures (fat, 1.5 per cent.; sugar, 6 per cent.; protein, 1.5 per cent., and fat, 2 per cent.; sugar, 6 per cent.; protein, 1.5 per cent.) for eight days; during which time he lost 12 ounces; had daily one or two greenish-yellow, loose, smooth, offensive stools with much mucus; no vomiting; took 34 to 38 ounces a day.

On malt-soup eleven days; during which time he gained 17 ounces; had daily two brown, loose, smooth stools, with very little mucus; no vomiting; took 34 to 38 ounces a day.

CASE 2. Age ten months. Admitted for intestinal indigestion. Had been breast-fed three weeks; condensed milk ten weeks; had milk-mixtures fifteen weeks. Before malt-soup had casein-flour milk (fat, 0.3 per cent.; sugar, 5.25 per cent.; protein, 2.75 per cent.) for one week; during which time weight was stationary; had daily three to five greenish-yellow, loose, smooth stools with some mucus; no vomiting; took 31 to 56 ounces a day.

On malt-soup twenty-one days; during which time he gained 33 ounces; had daily one to three brown, loose, smooth stools; no vomiting; took 56 ounces a day.

CASE 3. Age three and one-quarter months. Admitted for intestinal indigestion. Had been breast-fed for three months, when the supply of milk ceased. Before malt-soup had casein-flour milk and a (fat, 2 per cent.; sugar, 6 per cent.; protein, 1.5 per cent.) mixture for twenty-two days; during which time he lost 16 ounces; had daily one to three yellow, soft, granular stools; no vomiting; took 20 to 28 ounces a day.

On malt-soup sixteen days; during which time he gained 30 ounces; had daily three to four brownish-yellow, loose, smooth stools; occasional vomiting; took 35 ounces a day.

CASE 4. Age fifteen months. Admitted for chronic intestinal indigestion. Had been breast-fed one month; milk-mixtures ten months. Before malt-soup had been on different milk-mixtures, and casein flour milk for four months; during which time he gained 16 ounces; had daily three to four yellow, loose, smooth to lumpy, offensive stools with some mucus; no vomiting; took 56 ounces a day.

On malt-soup nineteen days; during which time he gained 38 ounces; had daily three to four yellowish-brown, loose to slightly lumpy stools, with at times mucus; no vomiting; took 63 ounces a day.

CASE 5. Age five months. Admitted for chronic gastrointestinal indigestion. Had been breast-fed two months; milk-mixture one and a half months. Before malt-soup had casein-flour milk; milk-mixtures; larosan for forty-eight days; during which time he lost 3 ounces; had daily three greenish-yellow, loose, lumpy stools; no vomiting; took 25 to 40 ounces a day.

On malt-soup twelve days; during which time he gained 20 ounces; had daily two to four yellow, loose, smooth stools; no vomiting; took 44 ounces a day.

EXAMPLES OF UNFAVORABLE CASES

CASE 1. Age two months. Admitted for chronic enteritis and infantile atrophy. Had been on some kind of milk-mixture, no other feeding history obtainable. Before malt-soup had been given milk-mixtures, buttermilk and Buco for forty-nine days; during which time he gained 23 ounces; had daily three greenish-yellow, loose, smooth to lumpy stools, with considerable mucus; no vomiting; took 16 to 24 ounces a day.

On malt-soup twenty-one days; during which time he gained only 6 ounces; had three to four yellowish-brown, loose stools, with considerable mucus, and later a starch reaction to iodin; no vomiting; took 30 ounces a day.

After malt-soup was given casein-flour milk, had better stools, and gained in weight.

This baby was unable to digest the starch. Apparently the sugar content was not too high, as there was no vomiting. It might have been possible to decrease the quantity of starch somewhat, and thus keep the patient on malt-soup.

CASE 2. Age one and one-quarter months. Admitted for regulation of feeding. Premature baby. Had been fed on peptonized milk-mixtures. Before malt-soup had been given milk-mixtures in addition to diluted breast-milk for fourteen days;

during which time he gained 3 ounces; had daily five to seven brownish-yellow, loose, lumpy stools, with much mucus; no vomiting; took 20 ounces a day.

On malt-soup twenty days; during which time he gained 5 ounces; had daily three to six greenish-yellow to greenish-brown, loose, smooth stools, with considerable mucus, and later a strong iodin reaction; had occasional vomiting; took 20 to 25 ounces a day. After malt-soup was given breast milk, but died in a week.

This child could not digest sufficient starch. At times, also, the malt-soup was not retained. The stools were frequent, and it is probable that the sugar content of the food was too high for this patient.

CASE 3. Age one and one-half months. Admitted for infantile atrophy. A seven-months premature baby. Had been breast-fed two weeks. Before malt-soup had been given breast milk in addition to milk-mixtures and casein-flour milk for twenty-eight days; during which time he lost 3 ounces; had daily one to four greenish-yellow, smooth to lumpy stools; occasional vomiting; took 20 to 25 ounces daily.

On malt-soup three days; during which time he lost 5 ounces; had greenish, lumpy stools, with much mucus; vomited a great deal; took 20 ounces a day.

After malt-soup was stopped he was again given breast milk, egg-whey, and buttermilk. Died eight days later.

This patient could not retain malt-soup, probably because of its high sugar content.

CASE 4. Age four months. Admitted for regulation of feeding. Had been breast-fed for four weeks; then on milk-mixtures. Before malt-soup had been given (fat, 1 per cent.; sugar, 6 per cent.; protein, 1.5 per cent.) mixture for five days; during which time he lost 7 ounces; had daily two to three greenish-yellow, loose, lumpy stools, with much mucus; no vomiting; took 28 ounces a day.

On malt-soup thirteen days; during which time he gained 8 ounces; had daily two to five brownish, loose, smooth stools, which were much improved; vomited; took 28 to 42 ounces a day.

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This paper was written at the suggestion of Dr. J. P. Crozer Griffith, to whom I wish to express my appreciation of his encouragement, and valuable criticism in its preparation.

1805 Pine Street.

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PROTECTIVE VACCINATION FOR VARICELLA—Ed. Handrick (Monatsschr. f. Kinderheil., Bd. XIII., Nr. 5, 1914) says that Kling inoculated children who had been exposed to varicella with serum derived from the pustules of the sick children with a view to obtaining prevention of the disease. After vaccination in this manner there were seen at the site of inoculation typical varicella blebs which matured and dried in the normal manner. In some children a modified form of the illness occurred. When this inoculation was carried from one child to another there appeared to be a preventive effect. Of 95 exposed to varicella, 31 were inoculated. Only 1 of these took the disease. Of the 64 unvaccinated children 44 took the disease. The author repeated this experiment on three small groups of children with the following results. He found that of 127 inoculated children, forty-five later developed varicella. He therefore believes that we have not yet attained a practical method of prevention of varicella by this method.—*The American Journal of Obstetrics.*

HEREDITARY SPINAL ATAXIA*

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Friedreich, in 1861, described a disease picture to which is usually attached his name (Friedreich's Disease), and which symptomatically labelled is a spinal ataxia of the hereditary type; a familial disease process. It was first regarded by him as a special phase of tabes dorsalis on account of the marked ataxia and the absence of the knee reflex. However, it was soon noted that in tabes there was an acquired degeneration of the upper motor neuron and in Friedreich's disease it was apparently a congenital morbid predisposition of certain neurons of the posterior and lateral tracts, as a result of which they never reached their full development or a permanent function, and a premature atrophy of these systems resulted. The hereditary origin is evident, since it is found in cousins and nieces of the same family and its congenital origin is evident from the fact that several members of the same family may be affected either with an actual disturbance in the co-ordinating system or by isolated symptoms not necessarily incapacitating the individual.

The disease develops at or about puberty, not often later than sixteen years of age; not infrequently it develops in infancy. It usually strikes the older members first. From reports observed, the males predominate as being afflicted. Professor Dana reports, however, that in America the females predominate in a proportion of three to two.

This disease must necessarily be differentiated from hereditary cerebellar ataxia, hereditary ataxia paraplegia and hereditary spastic paraplegia. The cause of their mode of origin is probably the same and it may not be common to find in families one or the other of these conditions.

Then, too, abortive forms of these four diseases undoubtedly occur and can be seen in the report of those cases which show only isolated symptoms of a disease process. Some authors have reported as isolated symptoms a disturbance in speech, a nystag-

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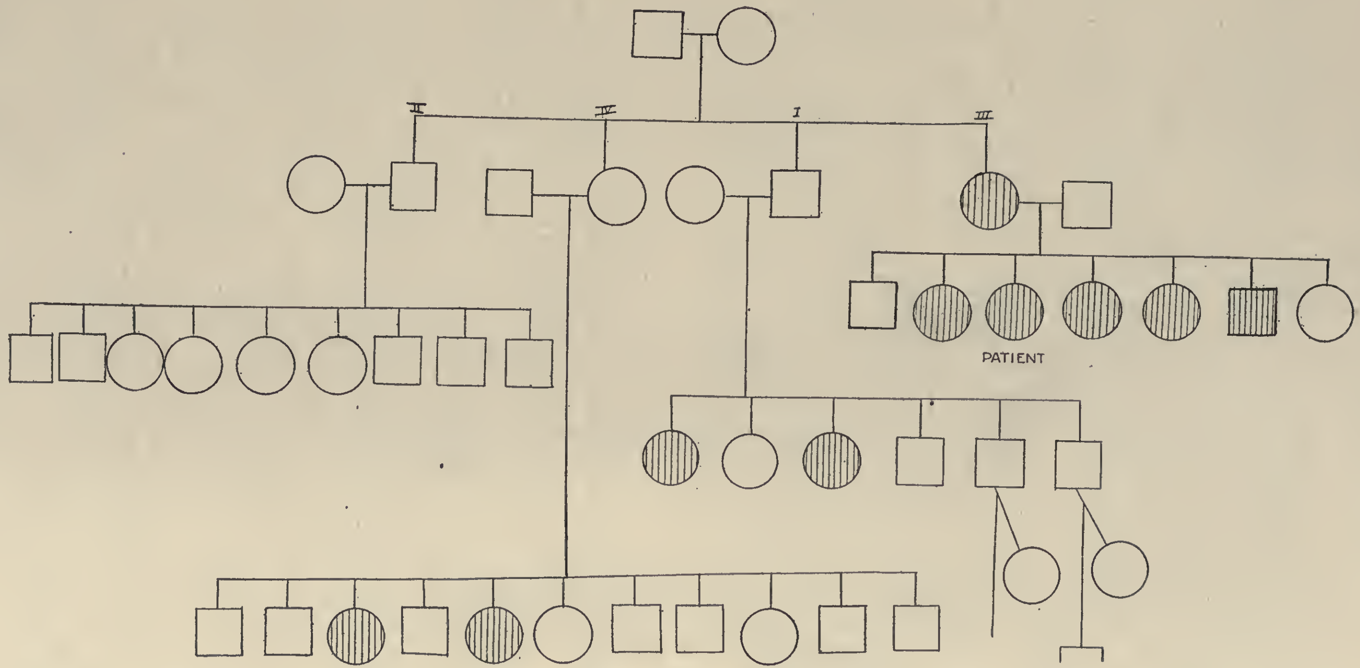
* Cases presented before Boston Neurological and Psychiatrical Society, November 21, 1912.



Friedreich's Disease. Polquet Family Tree mus or an absent knee-jerk. This latter symptom undoubtedly indicates the degenerative phase of the disorder, which is shown to be the fact in sections from cords, posterior roots and peripheral nerves.

In this report the cardinal symptoms of true Friedreich's disease will be demonstrated; attention will be drawn to its familial relation to isolated symptoms, not only indicative of posterior column or posterior root lesions, but also of lateral column involvement.

The family history can probably be best illustrated and studied from the accompanying family tree. The signs used are circle (female) and square (male).

The families first came under observation in 1912. The parents in all the families are French Canadians, who settled in a manufacturing town in Rhode Island. They are all mill hands with only limited education. The children attended school only to fill requirements and then went to the mills to work.

The first case reported, being a fully-developed case, led the examiner to investigate her family and relatives.

E. C. (Family 3). Age, seventeen; no occupation; single; Canadian.

Family History—There is no mental disease in the family for two generations. Mother and father are both well and neither one has had any serious illness. Four cousins (maternal) and three sisters and one brother are suffering from a nervous affliction, which is included in this report.

Personal History—She was born in Canada, seventeen years ago, the fifth in a family of seven. (Her mother not having had any miscarriages or still births.) The child was a full-term, no untoward symptoms during gestation. Labor was comparatively short in duration without any great pain. Bag of waters ruptured itself; vertex presentation. She had no convulsions in infancy. Began to walk at eighteen months without any abnormality. She began to talk at fourteen months (in French). Nothing abnormal about the teething stage. No evidence of rachitis or congenital lues. She has only had measles. At no time did she wet the bed or show evidence of a bladder difficulty. She began to menstruate at fourteen and has always been regular.

She was always of a happy frame of mind, had a good memory and a moderate power of observation. She was active and somewhat talkative; cheerful and optimistic, not inclined to worry and in no way conceited. She is generous, probably somewhat bashful, but has plenty of playmates and chums. She attended school until she was twelve years old, her reason for stopping being her inability to walk. At the time of stopping she was in the 3A grade (public school).

Present Condition—She first began to have difficulty in walking when about eleven years old, which has progressed to the stage of inability to walk without assistance, and a pronounced curvature of the spine. She has no other complaints.

Physical Examination—Shows a well-nourished and fairly well-developed girl of seventeen years. Sensibility of the cranium is normal. There is no disturbance of smell. Her eyesight is 2 O/2L in each field, with no heminopsia, scotomata or disturbance in the fundus.

Ocular movements are normal. No diplopia; a left lateral nystagmus is very marked. Pupils are 2½ mm. in diameter, equal and regular, and they react to light and to accommodation normally.

There is no disturbance in the motor or sensory branches of either fifth or seventh nerves. Her hearing is normal. The remaining cranial nerves show no disturbance. The tongue is tremulous. In the upper extremity there is no atrophy or hypertrophy, but the muscular power is weakened. No tenderness of the nerve trunks. All reflexes are present, but diminished. There is a marked tremor even while at rest and an ataxia while in motion, so that the finger-nose test is not accurately performed. There is no disturbance in sensibility, but there is some inco-ordination in supernating and pronating the hands.

The trunk muscles show considerable weakness and there is a decided scoliosis, both posterior and lateral curvature. The epigastric and abdominal reflexes are present. Light touch indicates hypersensitiveness, also pain and thermal sense. Her equilibrium is very unsteady, but there is no disturbance in sitting erect or lying down. No disturbance in bladder or rectal reflexes.

In the lower extremities there is no atrophy or hypertrophy, but there is hypotonus and weakened muscular power. The patellar reflexes are absent. The Achilles jerks are absent. There is no ankle clonus. There is a double Babinski sign, a double Oppenheim and Gordon extensor toe reflex. The gait is ataxic and with her eyes closed she will fall. Romberg sign is marked. The knee-heel test revealed some ataxia. Sense of localization and position were not disturbed. Light touch and pain sense revealed hypersensitiveness. There was no asynergia.

Poiquet (Family 1). The father is the oldest child in the Poiquet family. He has no neurologic disorder. By his marriage his wife had 6 children—3 boys and 3 girls—all alive. One girl and the 3 boys show no neurologic disturbance or evidence of isolated symptoms.

A. P., female, age eleven; U. S. A.; school girl. She is the youngest child, a cousin of the patient E. C. She is considered a normal child and has reached the sixth grade in the parochial school. She has no difficulty in gait or station, but upon physical examination it was noted that the patellar reflexes and Achilles jerks were absent and the Romberg sign was present. There was no inco-ordination or nystagmus.

M. P., female; age sixteen; Canadian; single; mill hand. She is the fourth child and oldest girl in the family and a first cousin to the patient E. C. She attended school until she was fourteen years of age, having reached the sixth grade in the parochial school. Since leaving school she has worked in the mill at a small wage. She has always had some unsteadiness in her gait and a tendency to fall if she ran. Upon physical examination it was revealed that she had a lateral nystagmus. There was no disturbance in her upper extremities or trunk. Her patellar reflexes and Achilles jerks were absent. There was no ankle clonus, but a questionable Babinski sign was noted. Her gait was ataxic, with decided increased inco-ordination with eyes closed. Romberg sign was present.

Poiquet (Family 2). The father is the next oldest child in the Poiquet family. By his marriage there were 9 children—5 boys and 4 girls. Owing to some suspicion, the examiner could not make a thorough physical examination of all the members, but roughly the examination showed no neurologic disease or isolated symptoms in this family.

Coté (Family 3). Mother C.; female; age forty-five. Canadian; wife of a weaver; temperate. She is the third in the Poiquet family of 4 and, as far as she knows, her mother had only 4 children, all alive. She has had very little education, but is able to read and write French, very little English. She has never had any serious illness. She has had no miscarriages. She has never known of any nervous disease on her paternal or maternal sides and has never had any difficulty in walking. Upon physical examination, however, it was found that she had absent patellar reflexes and absent Achilles jerks. There was no inco-ordination or nystagmus.

Coté *née* Poiquet (Family 3).

A. C., male; age twenty-two; Canadian; single; weaver by trade. The oldest brother of E. C.; shows no evidence of a neurologic disorder and no isolated signs or symptoms. He attended school until he was fourteen years old, receiving a moderate education. He did not graduate from grammar school. His personality could not be considered abnormal.

R. C., female; age twenty; Canadian; single; mill hand. She is the oldest sister of the patient E. C., who attended school until she was fourteen years of age, receiving a parochial school education. Then she went to work in the mill, receiving a moderate wage, but a capable worker. She has never had any difficulty in her gait or station. Upon physical examination it was found that she had absent knee reflexes and absent Achilles jerks. There was no inco-ordination or nystagmus.

M. C., female; age sixteen; Canadian; single; mill hand. She is the next younger sister of the patient E. C. She attended school until she was fourteen years of age; could not be called backward, for she, as well as her sisters and brothers, not only attended parochial and public schools, but also the French school. She did not graduate from grammar school. She has worked in the mill since leaving school at a small wage. She has had no disturbance in her gait, but it has always been evident that she was unsteady.

Physical examination demonstrated absent knee-reflexes, absent Achilles jerks and a Romberg sign, but there is no inco-ordination or nystagmus. She has a harelip.

D. C., female; age fourteen; Canadian; single; mill hand. The second younger sister of the patient E. C. She attended school until the present term, having reached the seventh grade in grammar school. Left school at working age to go to work in the mill. She has always had difficulty in walking, stumbling and falling, especially if she tried to run.

Physical examination revealed a lateral nystagmus in both eyes. Her reflexes in upper extremities are diminished. The patellar reflexes are absent, Achilles jerks are absent. Her gait is ataxic with a tendency to spasticity on the right side. There is a low degree of inco-ordination and a Romberg sign. There is no scoliosis or Babinski sign.

Ed. C., male; age eleven; Canadian; schoolboy. The youngest brother of the patient E. C. He is attending public school, has not been kept back and is evidently progressing fairly well. He has never had any disturbance in gait or station. Upon physical examination it was found that he had absent patellar reflexes and absent Achilles jerks. Otherwise neurologic examination was negative.

G. C., female; age seven; Canadian; school girl. The youngest sister of the patient E. C., who is attending a parochial school, and, as far as is known, has not presented any defects. She has never had any disturbance in gait or station and physical examination does not reveal any neurologic signs or symptoms.

Lizotte *née* Poiquet family (4).

The mother is the youngest in the Poiquet family. She has never had any complaints and physical examination reveals no neurologic disorder or isolated symptoms. Her husband likewise is normal. By her marriage she has given birth to 4 girls and 7 boys, of which 2 girls show a possible neurologic disorder.

G. L., female; age twenty-four; U. S. A.; single; mill hand. She is the third child, oldest girl, and a first cousin to the patient E. C. She is a normal individual, having received a moderate education and since leaving school has earned a good wage in the mill. She has always complained of a difficulty in walking, a tendency to stumble if in a hurry.

Physical examination revealed no disturbance in the motility of the eyeballs. The patellar reflexes and Achilles jerks were markedly exaggerated. There was a bilateral ankle clonus. The Babinski sign was present on both sides. She complained of feeling less strong in the left leg. Her gait was somewhat spastic. Romberg sign was absent.

E. L., female; age twenty-two; U. S. A.; mill hand. She is the fourth child, second oldest girl, and first cousin to the patient E. C. She attended school until fourteen years of age, appears to be of fair intellect. She has worked in the mill since leaving school. She has had no difficulty in her gait or station. Physical examination merely revealed very exaggerated knee-jerks and Achilles jerks. Otherwise there were no neurologic symptoms, complex groupings or isolated symptoms.

A Wassermann reaction on the blood serum was performed on two of the Coté family and proved negative. There were no lumbar punctures performed.

To sum up: In this short report several factors are strikingly brought forth:

(1) The hereditary and familial type of the affliction.

(2) It affecting, with one exception, the female side of the family groups.

(3) The prominence of isolated symptoms indicative of a morbid predisposition.

(4) The fact that members of families 2 and 3 show symptoms isolated or complex groupings of both posterior and lateral column disease involvement and members of family 4 only of lateral column involvement.

(5) Although all the children may be called constitutional inferiors, evidence of gross mental defect is lacking.

In conclusion, the examiner is indebted to Dr. Frank Peckham for his observations on the cases and to Dr. George L. Shattuck, through whose kindness this report was made possible.

Butler Hospital, Providence, R. I.

TREATMENT OF SPASMOPHILIA BY COD-LIVER OIL AND TRICALCIUM PHOSPHATE—Ernst Schlossmann (Monastchr. f. Kinderheil., Bd. XIII., Nr. 6, 1915) has treated 4 cases of spasmophilia with cod-liver oil and tricalcium phosphate, with excellent results. Without any other treatment or changes of hygiene a permanent cure of spasmophile symptoms was obtained, including laryngospasm, Chvostek's sign, and increased electrical irritability after a short time. The harmlessness of these drugs recommends them in the treatment of all sorts of nervous diseases of children.—*The American Journal of Obstetrics.*

SOCIETY REPORTS

NEW YORK ACADEMY OF MEDICINE—SECTION ON PEDIATRICS

Stated Meeting, Held November 11, 1915

WALTER LESTER CARR, M.D., CHAIRMAN

A SIMPLE OUTFIT FOR THE DISTRIBUTION OF DIPHTHERIA TOXIN

DR. ABRAHAM ZINGHER exhibited the apparatus which the New York City Department of Health is now distributing to the physicians of the city free of charge. Dr. Zingher stated that in a series of 800 children who gave negative reaction to the Schick test, although a considerable number had been exposed to diphtheria, not a single child had developed the disease. They therefore felt confident that a negative reaction meant immunity, while a positive reaction indicated a probable susceptibility to diphtheria. Dr. Zingher said they had been making some experiments as to the duration of immunity after the usual 1,000 units of diphtheria antitoxin and had found that the first dose gave an immunity for from fourteen to twenty-one days, while a second dose protected only from seven to ten days. They also found that in those naturally immune an immunizing dose produced greater immunity. The more recent experiments with the toxin antitoxin mixture showed that an active immunity did not develop immediately, or soon enough to be of value in giving immediate protection in the wards where the subject was exposed to the disease, but that many who did not become immune at first later developed immunity.

The outfit presented was devised to furnish a standard amount of undiluted diphtheria toxin, which remained of fairly constant strength when kept in the ice-box, and could be readily diluted when required. In this way they had overcome the difficulty that stood in the way of popularizing the Schick test, since the diluted toxin deteriorates on keeping either in solution or in tablet form. The operator should be skilled in the intracutaneous injection, and should consider all reactions true, unless able to distinguish the positive and pseudo reactions. The pseudo reaction can generally be distinguished clinically from the true reaction. It appears earlier, is less sharply circumscribed, and usually disappears in from three to four days. It is characterized by a central area of redness of varying size, surrounded by a secondary areola. On fading it leaves only a faintly pigmented area, which soon becomes invisible.

The outfit for the Schick test consists of a capillary tube and a small rubber bulb, such as are employed in the distribution of vaccine virus, and a bottle containing 10 c.c. of sterile physiologic saline solution (with 0.025 per cent. phenol). The capillary tube contains two minimum lethal doses for the guinea pig of undiluted diphtheria toxin. This toxin should not be a freshly prepared lot, but should be ripened for at least a year. The capillary glass-tubes were filled by means of a 0.25 c.c. record syringe and a fine needle. The ends of the capillary tubes were then sealed in the flame.

In using the contents of the tube, the one end was broken off and pushed carefully through the neck of the rubber bulb until it punctured the diaphragm within, and entered the cavity of the bulb; then the other end of the tube was broken off. Holding the bulb between the thumb and middle finger and placing the index finger over the opening in the larger end of the bulb, one expelled the toxin into the saline. The capillary tube should be rinsed out by drawing up saline several times. Then cork the bottle and shake the diluted toxin. Exactly 0.1 c.c., representing one-fiftieth of the lethal dose for the guinea pig, is then injected intracutanaously on the flexor surface of the forearm. The contents of the bottle are sufficient for about eighty tests. On account of the fairly rapid deterioration it is not advisable to use the diluted toxin after about twelve hours. A 1 c.c. record tuberculin syringe and a fine platinum iridium needle (No. 22 Burroughs, Wellcome & Co)., or a steel needle No. 3 B. W. & Co.) are preferred. An ordinary hypodermic syringe, unless graduated to 0.1 c.c., is not satisfactory.

SYMPOSIUM ON INFANT FEEDING

(See pages 1-36.)

DISCUSSION OF SYMPOSIUM ON INFANT FEEDING

Dr. Charles Gilmore Kerley said he had been particularly impressed with Dr. Bartlett's paper on the salts in cow's milk and that it had opened up a field which had been very much neglected. Not much attention had been given in the past to the intake and outgo of salts and he was glad to see that this element of the infant's food was at last receiving consideration. The point that the giving of salts in the form of vegetables when the infant was five or six months of age was an advantage was well taken. Of course maternal nursing was the ideal way of feeding a baby, but many babies after reaching the age of seven months showed some signs of malnutrition in the way of rickets if they did not receive additional food. Perhaps a great deal of the credit given to maternal nursing was due to the fact that very frequently where the mother nursed the baby it received additional food at a comparatively early period. Instead of giving egg and milk, particularly in young infants, a better scheme was to give protein-free milk. Dr. Harrison of Yonkers, has been preparing a skimmed milk which is protein free and is supplied in powdered form, so that one got the salts of the milk and the milk sugar. This preparation could be given in the amounts desired to children on the breast, thus furnishing the amount of salts that were desirable. This protein-free skimmed milk ought to and does supply a useful supplementary feeding.

DR. MORSE has called attention to the distinction that must be made between the well child and the sick child. This is a distinction which we must always keep in mind. The well child requires and takes 3 or 4 per cent. of fat, but it is not difficult to feed well babies. There are hundreds of them brought up all over the country on milk and cereal without any trouble and that is not our problem; it is the feeding of the sick child that requires all our efforts, and in such instances we have to follow a different line of procedure. In case a child has carbohydrate indigestion we give it low sugars and find that it will take proteins better; if there is fat indigestion we reduce the amount of fats and make up for it by the addition of starch. Some young children have a very good capacity for starch and can tolerate starch up to 4 per cent. In these various ways one can raise the calories to the required amount and thus carry a baby over a difficult feeding period.

DR. HENRY DWIGHT CHAPIN said he was interested in Dr. Holt's views with reference to the feeding of protein and particularly with reference to what he said about casein, as to amount of casein being less important than its nature. Many years ago he called attention to the fact that the casein has a developmental function in young animals and in infants as well as a nutritive function. The protein in the milk of different species of animals coagulates in different ways. For instance, taking the ruminant herbivora we find that the casein coagulates in hard lumps which are intended to develop the motility of the animal's stomach, because the animal must later feed on grass, grain, etc, etc. In this class of animals the stomach is 70 per cent. of the entire digestive tract and it is important that the casein be of such a character as will develop the motility of this organ. On the other hand, in the non-ruminant herbivora, as the mare and the ass, the casein coagulates in a gelatinous mass that passes easily through the pylorus and later on digestion is largely intestinal in these animals. In human milk which is midway between these two we get a soft flocculent coagula. In the infant the stomach is only 20 per cent. of the entire digestive tract, so that a considerable portion of the digestive process takes place in the intestines. We thus learn from biology that the casein has not only a nutritive, but also developmental function to perform and we have learned why we need not be so afraid of giving protein as we formerly were, and why it is not advisable to go to extremes in trying to modify it. At birth, the different species of animals all digest milk alike, but at the end of a year, all are taking different kinds of food. The milk has developed the digestive tract in each species in a different way, and if we wish to be successful in the feeding of the infant we must follow nature.

Dr. Chapin said he was glad to hear Dr. Morse champion the fats; they had frequently been giving too low fats. Too much emphasis had been placed on calories; they could get the required number of calories by substituting starch for fat. There was danger that in this way the result would be a crop of rickets. Babies thrived on fats in New York as well as in Boston.

Dr. Morris Stark called attention to the socalled deficiency diseases in which metabolism experiments in young animals seemed to show that the carbohydrates played a prominent part. Beri-beri had been attributed to a deficiency in certain of the carbohydrates of rice due to the polishing process and pellagra had been attributed to some deficiency in maise. These substances which were necessary if certain carbohydrates were to fulfill their nutritive function had been called by Funk "vitamines." It seemed that these vitamines could take care of a certain amount of starch, but if there was an excess of starch above what they could care for, the sugar in the blood was not taken care of and released as a simple monosaccharide, but remained to be excreted by the kidneys, and when they could no longer take care of it, there was a resulting acidosis and grave sequellæ, such as diabetes. The normal combination of fats could not take place, unless there was a carbohydrate reduction with a definite amount of salts. It had been shown that there were enough salts in ordinary food for this purpose and that they could not be replaced by any other form of food, and that, furthermore, there was only a proper reduction in the presence of a proper amount of vitamines. It might be that the vitamines had a direct relation to rickets and they could possibly get more definite knowledge in regard to rickets and these other deficiency diseases if they would study the metabolism in these conditions.

PRESENT OPINION AS TO THE USE AND ACTION OF CARBOHYDRATES IN INFANT FEEDING

Dr. Thomas S. Southworth said that, as was well known, the part played by the carbohydrates in the economy of the infant as in that of the adult was primarily that of furnishing fuel for heat and energy. Sugar entered largely into the composition of breast milk, indicating that carbohydrates in some form were an essential part of the food of the infant, as indeed of all young mammals. Mendel says: "Carbohydrates have been shown to be necessary to the nutritive functions, for when they are lacking metabolism exhibits pathologic manifestations." In the routine feeding of the normal healthy infant there really seems little to choose between the employment of lactose, saccharose and maltose-dextrin, each of which has stood the test of extended and enthusiastic use. This statement, however, called for certain qualifying comments. Lactose would seem to have Nature's endorsement; while its slower absorption and favoring influence upon the normal flora of the intestine presented certain advantages, but these might cease upon the occurrence of intestinal disturbances. More attention should be paid to Coit's warning that lactose from unreliable sources might be capable of producing otherwise inexplicable disturbances of digestion. Certainly the sources from which cane sugar and maltose-dextrin are derived are cleaner, from the medical standpoint, of the production of toxins. The relative cost of these three forms of sugar may also be a determining factor among the poor and in certain charitable institutions. It might also be mentioned that the limit of tolerance for maltose-dextrin is about double that of the other forms of sugar, and is less liable to cause disturbance when reasonable amounts are unwittingly exceeded. In the disturbed conditions of the gastrointestinal tract the greatest interest has centered about the trial of sugars. Probably Finkelstein's most valuable contribution to infant dietetics has been the emphasis which he has placed upon the irritative and laxative effects of the sugars, especially lactose when not well borne, and the measures he has suggested for combating them, even if we cannot accept his views *in toto*. The injurious effects of carbohydrate intolerance are manifest, for while in the normal intestine the carbohydrates have a negligible influence upon the absorption of fat, when they become irritative in the course of abnormal fermentation, increased peristalsis occurs, with resultant disorganization of the orderly process of absorption in the bowel and nutritive material is swept out with resulting malnutrition. The desideratum then is to eliminate or decrease the fermentation in order to restore absorption. The importance of this loss of nutritive material from increased peristalsis would, the author prophesied, play a large part in the future management of malnutrition cases. Furthermore, in fat intolerance accompanied by excess of unneutralized fatty acids, or the increased formation by the body of ammonia, an abnormal fermentation of the sugars may intensify the picture. Thus acidosis may be caused not only by the abstraction of alkali, but through failure of normal absorption of nutritive material. Here not only the reduction of the fat in the food and the administration of some alkali is indicated, but the substitution of a combination of lactose, dextrin and starch often changed the flora of the intestinal tract, and favored much needed absorption. Cereal decoctions have long been used with little knowledge of the percentages employed, owing to an impression that their action is largely mechanical. It appears that 0.75 per cent. of starchy cereal is within safe limits for infants and sufficient for its protective colloidal effect upon caseous coagulation. The importance of the careful determination of the percentage of cereal should not be overlooked.

The author had in a paper some time ago called attention to the protective, curative or remedial properties of boiled starch in disturbances of the gastrointestinal tract in infants. The mechanical value is widely recognized and that cereal contained vegetable proteins which were utilized would also probably be conceded. Dextrin and starch might be discussed together, since they have a close relationship and similar properties. Difference of opinion as to the use of these cereal foods is chiefly confined to the question at what age such utilization becomes sufficient to be taken into account. Undoubtedly the age varies somewhat with the individual, but as long as the presence of amylolytic ferments and their steady increase in production is admitted there is no question of their acting on cooked starch when this is introduced with the food. Such feeding, however, should be kept within safe limits. In the normal infant if the other food elements are well balanced there is considerable elasticity in the tolerance of starches.

After discussing the curative and protective action of starch in cases in which there is intestinal disturbance due to faulty digestion of other food elements or to abnormal fermentation or putrefactions of bacterial origin, the author shows that there is a definite advantage where the intestinal disturbance has arisen from the use of a single disaccharide, either lactose or saccharose, in substituting for them mixed carbohydrates, dextrin and maltose, or starches, dextrin and maltose.

RUPTURE OF THE HEART IN A CHILD—J. Anderson (Lancet, March 27, 1915) records a case of spontaneous rupture of the heart in a girl five years of age. The interpretation which was placed on the case was that the child was the subject of an abnormal development of the coronary arteries. The vessels were unusually narrow and the lumen was encroached upon in places by the areas of thickening in the inner coat, due evidently to a syphilitic endarteritis. A hematoma in the septum was more than likely the result of thrombosis in the descending branch of the left coronary artery, and represented really a dissecting aneurysm of the heart wall. Evidences of syphilis were seen in the other organs as well as in the heart itself. Spirochetes were demonstrated in the heart muscle.—*The American Journal of Obstetrics.*

THE PHILADELPHIA PEDIATRIC SOCIETY

Stated Meeting Held Tuesday, June 10, 1915

Dr. Ginsburg exhibited a stomach showing hyperplastic pyloric stenosis and a heart from the same patient which presented a patent foramen ovale. The history of this case was as follows: A first child; instrumental delivery. At birth the baby weighed 8 pounds. Three weeks before admission to the hospital, after satisfactory nursing at the breast, it began to vomit, the vomitus being projectile in type. In spite of rectal feeding and modification of breast feeding, the child continued to vomit and was admitted into his service at the Jewish Hospital, being five weeks of age at the time of its admission. The baby weighed 5¼ pounds, and there was a palpable tumor in the region of the pylorus with epigastric peristalsis.

At operation, through a median incision in the epigastrium, it was impossible to deliver the stomach owing to the firm, immobilized pyloric end of the stomach, which was greatly thickened. The pylorus was spindle-shaped, as exhibited by the specimen; very thick, indicating enormous hypertrophy of its musculature.

A posterior no-loop gastrojejunostomy was performed. Five days later, owing to the unsatisfactory state of the patient, the abdomen was reopened, the posterior anastomosis closed, and an anterior gastroenterostomy performed, making a big orifice.

The baby ceased vomiting, except for an occasional eructation, and gained 15 ounces in the succeeding nine days. Food digestion took place, as evidenced by normal, yellow bowel movements and absence of vomiting. On the ninth day, when the baby apparently was doing well and recovery seemed certain, it developed temperature and died.

At autopsy a condition of the stomach showed an enormously thickened pylorus and a functionating gastrojejunal orifice.

Dr. Ginsburg believes that in hypertrophic pyloric stenosis, with almost complete occlusion of the pyloric passage, the operation of choice is posterior gastrojejunostomy.

Dr. Pfahler demonstrated about thirty-five Roentgenographic lantern slides of interesting cases occurring in children varying in age from fetal life to the beginning of adolescence, and emphasized the importance of making use of the Roentgen rays in obscure cases.

The first was a series of fractures and injuries to the bones, giving rise to obscure symptoms. In 1 case an oblique fracture of the femur was found in a child of six weeks in whom there had been no history of an injury, and because of the extreme tenderness, swelling and accompanying fever, the thigh was incised for an abscess. No abscess being found, it was thought to be sarcoma. The Roentgenogram showed clearly an oblique fracture.

A series of diseases of bones and joints were clearly diagnosed by means of Roentgenographic studies.

A demonstration followed of several cases of enlarged thymus which had produced asthmatic breathing with paroxysms of supposed croup.

Several cases of sarcoma of the jaw were shown, demonstrating the disease and the healing influence of the rays. Recovery in from two to six years.

Cases of dilated hearts and obstructions of the bowels were also demonstrated.

Dr. Jay F. Schamberg exhibited a series of slides illustrating the common eruptive conditions observed in children. First, there was a series of illustrations of vaccinia in children born of mothers suffering from smallpox. The experience of Dr. Welch and Dr. Schamberg was not in consonance with that of Professor Roger, of Paris, who claimed that the vast majority of children born during or immediately after a maternal attack of smallpox were insusceptible to vaccination. Children vaccinated during the first weeks of life appear to develop less constitutional reaction than older children.

Several slides were shown to contrast the eruption between chickenpox and smallpox. The fact was emphasized that the number of lesions and the amount of fever present are no safe guides as to the diagnosis. The diagnosis is based on the distribution of the eruption, the presence or absence of the prodromal illness, the depth of the lesions in the skin, their uniform character in smallpox and their multiform character in chickenpox.

There was next exhibited a photograph of a child with measles with a closely aggregated papular eruption simulating the exanthem of scarlet fever. Dr. Schamberg said that he had but recently made an error of diagnosis in such a case in which an accidental coryza swayed the diagnosis in favor of measles, whereas a subsequent typical desquamation of the fingers demonstrated that the case was in reality scarlet fever.

Slides were shown of infantile eczema and also of certain infantile eczematoid eruptions due to pyogenic micro-organisms, and resulting from the contact of the discharges from the eyes, nose and ears. The causes of infantile eczema are still obscure, but recent investigation would indicate that certain food stuffs for which patients may have special idiosyncrasies may be responsible in many cases. Where a child is fed on maternal milk an excess of fats may be a factor.

Another series of slides showing the various forms of tuberculosis of the skin in children was shown. A case of considerable interest was that of a child who developed an attack of warty tuberculosis on the sole of the foot, presumably following some local infection through a wound. It developed a femoral adenitis which suppurated and in the discharge were found tubercle bacilli.

A number of varieties of ringworm of the scalp and smooth skin were demonstrated. Dr. Schamberg referred to the fact that ringworm of the skin was commonly contracted from cats, dogs and other domestic animals, and that under such circumstances the number of lesions was usually much greater than when contracted from the human subject.

Several varieties of bromid eruption in children were exhibited and emphasis was placed upon the fact that nursing infants may develop characteristic fungating bromid lesions through the drug imbibed in maternal milk. Another point of interest was that lesions of bromid eruptions may continue to appear several weeks after the last dose has been taken, in view of the very slow elimination of the drug. Dr. Schemberg had seen a number of bromid eruptions in children in which there had been a suspicion of smallpox on the part of the practitioner in charge.

Dr. M. F. Manges first showed a very interesting series of skiagraphs of the skull illustrating cases of internal and external hydrocephalus, and cases of injury to the skull. He emphasized the point that no matter how soft the tissue pressing on the cranium it will eventually leave its mark on the bone, which may be clearly seen in the X-ray. This was brought out very well by some pictures of a case which he diagnosed as glioma, and which was proved by operation.

Next some cases of mastoid involvement were shown, and the contrast between the normal mastoid cells and those filled with exudate was clearly depicted on the screen. Dr. Manges here spoke of the importance of the X-ray as showing the line of the lateral sinus.

Some thymus cases were shown. Often the single treatment by X-ray would cause a disappearance or a marked lessening in the size of the thymus shadow. This was probably due in many cases to the fact that at the time the first picture was taken the thymus was temporarily congested.

The contrast between early and late tuberculosis in the hip was the next series.

When showing some pictures of a congenital dislocation of the hip, Dr. Manges spoke of the fact that the X-ray was not so necessary for the diagnosis, as that was usually easily made, but X-ray showed the very important point as to whether the acetabulum was sufficient to receive and retain the head of the bone.

Other plates shown were: a tubercular ankle, congenital dilatation of the colon, and a series of fractures. One of these latter was very interesting in that it showed an injury to the elbow, with the head of the radius broken off and in very poor position, and in spite of this the child was very comfortable in Jones' position. Without the use of the X-ray in this case a very bad deformity would have resulted.

Dr. Ginsburg, in the discussion, said he was much interested in the radiographs shown on the screen by Dr. Pfahler and Dr. Manges. He has always been interested, however, in the radiographic diagnosis of empyema cases both before and after operation. He does not believe that we are attacking the empyema problem from the right standpoint in purely submitting cases to drainage by rib resection or intercostal drainage without resecting the rib. The problem really begins in empyema cases that drain after the operation and do not apparently dry up to eliminate the pathogenic pleural surface which becomes thickened and by adhesion prevents the lung from expanding in the abscess cavity. And it is the X-ray phase of the question that will do much to clear up this problem by properly portraying the size and location of these persisting sinuses leading to the abscess sacs.

Dr. Pfahler said that he had used with a reasonable degree of success collargol and argyrol in outlining empyema cavities. He could see no reason why such opaque solutions could not be used in any cavity where it was possible to inject fluid. In regard to the X-ray study of thymus he had found that quite a proportion of children showed an enlarged thymus without symptoms. The thymus yields promptly to X-ray treatment.

Dr. Manges said that he had some experience in X-raying cases of empyema, and he found that by the use of weak argyrol solutions and large quantities of soft rays and the use of the fluoroscope he had in most cases been able to obtain the most satisfactory result.

Ultimate Results of Harelip and Cleft-Palate Operations—G. V. I. Brown (Journal of Surgery, Gynecology and Obstetrics, 1915, Vol. XX., p. 87) says that in order to be on the safe side he makes every effort to provide as perfect a palate as possible at a sufficiently early age to make sure that no adverse speech habits have been acquired. Therefore all operative procedures are completed, if possible, before the child is two years old, and preferably at eighteen months or even earlier. Nevertheless, some of his best results, as evidenced by freedom from the characteristic cleft-palate speech sounds, have been secured with patients whose ages at the time of the palate operation varied from nine to sixty years, and some of the most imperfect speech results have been with patients that were completed before they were two years old. The natural conclusion from this, especially when one considers another class of cases in which there is defective speech of similar character due to imperfect form in development of hard or soft palate, although without any indication of a cleft, is that perfection or imperfection in form is of paramount importance and often a more active factor in determining the speech results after cleft-palate operation than the speech habit difficulties which have been hitherto considered of first importance.—*The American Journal of Obstetrics.*

DEPARTMENT OF ABSTRACTS

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J. Herbert Young	Newton, Mass.

KNOX, J. H. MASON, JR., WAHL, H. ROSWELL, AND SCHMEISSER, HARRY C.: GAUCHER'S DISEASE (A REPORT OF 2 CASES IN INFANTS). Bulletin of Johns Hopkins Hospital, January, 1916, p. 1.)

These cases occurred in 2 children of the same parents that came under observation during a period of two years at the Thomas Wilson Sanitarium, in the service of Dr. Knox. The disease in each instance ran a fatal course in a comparatively short time. The first case had been admitted to the Harriet Lane Home of the Johns Hopkins Hospital and had been studied by Dr. Howell, but the pathologic examination, in both instances, had been made by Dr. Wahl. A study of the literature reveals that there is some uncertainty surrounding the disease described by Gaucher, and it is now agreed that the term Gaucher's Disease can be properly applied to only a small group of splenomegalies, namely, those cases in which the organs show the presence of certain distinctive large cells. Since 1888 there have been only 16 cases reported, but the larger majority of them have been in the past two or three years. This has led the authors to believe that this condition is more prevalent than has been suspected, and as the peculiar features of the disease become more generally known the number of the cases reported will probably increase rapidly.

CASE I. Infant nine months of age; family history negative; Present history and present illness: Child had been breast-fed one month, then given cow's milk mixture, and never thrived; for a month or two she vomited frequently, but for the three months previous to admission the food was well retained; had cut two teeth in six months, and was never actually sick. Gain in weight had been slow. On admission to the hospital child weighed 11 pounds and was considered emaciated, skin was pale, with slight brownish pigmentation, most marked on face and arm. The abdomen was prominent; glands were enlarged. The upper border of the liver had extended 2½ inches below the margin of the rib in the right nipple line. The liver was smooth and firm, the spleen was represented by a large mass extending 4½ inches below the left costal margin, the surface was firm and a little rough. Blood examination showed: Leukocytes, 10,400; red cells, 5,200,000; hemoglobin, 90 per cent. Differential count: Polymorphonuclears, 42 per cent.; large mononuclears, 5 per cent.; small mononuclears, 41 per cent. One month later the blood condition was as follows: Red cells, 4,400,000; leukocytes, 25,400; hemoglobin, 60 per cent. Differential count: Polymorphonuclears, 59 per cent.; large mononuclears, 3.2 per cent.; small mononuclears, 36 per cent.; transitionals, 1 per cent.; myelocytes, 1 per cent. The Wassermann and von Pirquet tests were negative. Patient continued to lose in strength and weight and death resulted from exhaustion at the age of eleven months.

Autopsy findings show that the liver extended 7 cm., spleen 5.5 cm. below the costal margin, with general glandular enlargement. The liver was considerably enlarged and weighed 415 grams; it was pale with grayish pink color. Through the capsule were numerous big dots surrounded by a pale yellow periphery. On section, the surface showed a pale yellow or slightly mottled grayish yellow, moist surface, from which a thick yellowish mucoid material could easily be scraped off.

The surface of the spleen was mottled with patchy grayish pink color, on section the organ cut easily and the splenic pulp was friable. The cut surface was rather moist and showed numerous red, slightly translucent areas. There was a marked increase in the fibrous tissue. The pancreas and kidneys showed no changes.

Case II. Received February 11, 1914, age five months, and the mother remarked that this baby had the same disease as its sister, who had died twenty months before. The similarity in appearance between the two infants was striking. The patient was emaciated, weight 8 pounds, abdomen was distended, liver enlarged, and extended 2½ inches below the costal margin. The spleen was also enlarged and firm. The blood condition was as follows: Red blood cells, 3,024,000; white blood cells, 11,240; hemoglobin, 65 per cent. Differential count: Polymorphonuclear cells, 34 per cent.; lymphocytes, 60 per cent.; transitionals, 3.5 per cent.; eosinophiles, 1 per cent.; basophiles, 1.5 per cent. The von Pirquet and Wassermann tests were negative.

The child was admitted to the hospital and all of its symptoms continued about the same; no improvement. The patient lost strength and died from exhaustion seven months after admission to the hospital.

The autopsy showed changes similar to Case I. The origin of these characteristic, large, pale cells, is not very clear. Their structure, position and staining reaction are identical with those described in the small group of cases first reported by Gaucher, who, at first, considered them to be epitheliomatous cells. At present there is no evidence that these cells are derived from any particular tissue cells. The names applied to this disease are innumerable and misleading because they attempt to be descriptive terms; they fail to describe the new cases and the constant variations which are being added each year, which should be included in a term which describes them. Considerable confusion would be avoided in all cases were the terms simply "Gaucher's Disease" until more definite information concerning the nature of the process is obtained. R. D. M.

BRYAN, O. N.: THE TUBERCULOSIS PROBLEM. (Southern Practitioner, January, 1916, p. 7.)

Bryan calls attention in his original communication to the fact that between 150,000 and 200,000 are killed each year by tuberculosis, and that half a million people are constantly suffering from the ravages of this disease. In his well-written article he asks the question if we are doing all that we should do to reduce this awful condition. It is not only the immediate death of an individual, which is so costly to the State, but it is a period of partial disability, which lasts, in the majority of cases, from one year and seven months to two years, and the period of total disability, which lasts about one year, the total length of time being almost two years when the individual so affected has to be supported by the community. He believes that early diagnosis is the only hope for those who are afflicted with tuberculosis and even early diagnosis, combined with early and good treatment, does not seem to help those who are easily susceptible, and in whom there is not the fighting ability to prevent the spread of the disease. He makes a special plea for state and county sanitariums, which are well-equipped and up-to-date, so that these patients may be isolated and treated along the proper lines. The principles involved, he believes, in the management of tuberculosis, are as follows: Conserving the patient's energy by fresh air, sunshine, plenty of nutritious food, rest, and the care of a physician who is familiar with every phase of the tubercular problem. R. D. M.

SYLVESTER, W. W.: THE ALLEN TREATMENT OF DIABETES. (The Virginia Medical Semi-Monthly, January 7, 1916, p. 20.)

The first step in the Allen treatment of diabetes is to fast until glycosuria ceases and then for twenty-four to forty-eight hours longer, until all acetone disappears. During the period of fasting, patient is given water with small amounts of alcohol as a food; alcohol does not produce sugar in the urine. Alkalies are useful during the first few days if coma seems imminent, but they are no longer needed. Sodium bicarbonate may cause the ferric chloride reaction to remain positive longer than it otherwise would. After the fasting period, and the patient is sugar-free, the next step is to begin feeding, very slowly and cautiously, starch or sugar along a fixed programme. This has to be weighed each day and it is best to begin with a very small quantity, slowly working up until the patient's tolerance for sugar is reached, which is indicated by the appearance of sugar in the urine. Any trace of sugar is an indication for another fast day, with or without alcohol. The first day after the fasting the food may be 200 grams of vegetables, and this is slowly increased day by day. With the vegetables one or two eggs may be given, and slowly protein and fats are added until their tolerance is determined. At first, there is a marked loss of weight in these patients, but this is not a thing which is to be dreaded, because the weight itself is usually a hindrance to keeping the patient sugar-free, and must be gotten rid of. Allen has found that, combined with this slow feeding of starch, vegetable or other foods, exercise is very essential, and the tolerance for sugar with active exercise may be doubled in a few days. About every seven days, if the patient is progressing favorably, he is given a fast day, which, in itself, increases the sugar tolerance considerably. The ability for these patients to be kept sugar-free depends upon their willingness to adhere strictly to rule, and not over-indulge themselves in the things they should not have or in as large quantities as their tolerance would stand. R. D. M.

HUMMEL, E. M.: REMARKS ON THE CAUSES AND PATHOLOGY OF INSANITY. (New Orleans Medical and Surgical Journal, January, 1916, p. 463.)

Hummel brings out the part played by heredity in insanity and calls attention to the duty of the physician of to-day in handling the heredity of to-morrow. Proper mating he believes is important in offsetting a psychopathic strain. Causes which have a remote as well as a near influence he mentions as follows: Psychoneuroses resulting from mental trauma, acute infectious diseases, demands of modern life, especially in cities; alcohol, syphilis, and toxins.

WILLIAMS, EDWARD CECIL: THE OCCURRENCE OF ACIDOSIS IN CHILDREN. (The British Journal of Children's Diseases, November, 1915, p. 327.)

Acidosis has been defined as the occurrence of certain organic acids in abnormal amounts in the blood and urine. Beta-oxybutyric acid is the chief body present, diacetic acid and acetone being derived from it by oxidization. The acetone bodies, so-called, may originate from any or all of the three classes of foodstuffs, but in the majority of cases it has been found that they arise from the metabolism of fats, and in severe cases of diabetes from proteins as well. The author has tabulated the symptoms arising in 13 cases; of these, 5 were boys and the rest girls; all were under eleven years of age and over three; 3 cases presented, on admission, symptoms suggestive of meningitis; but on examining the cerebrospinal fluid there was found no cytologic changes nor organisms; examination of the urine, however, showed the presence of acetone and diacetic acid in varying degrees. Two cases of mussel poisoning (mytilotoxin) and 1 case of ice-cream poisoning showed marked acidosis. In the 2 cases of mussel poisoning nervous symptoms were predominant, whereas in the ice-cream poisoning there was pyrexia with great remissions of temperature. In 1 case acidosis preceded pneumonia (for seven days) and in another case the acidosis occurred during the course of a pneumonia, and in a third case, whose urine contained sugar on admission, the sugar quickly disappeared, and the patient developed signs of pneumonia with acidosis, which were followed by an empyema. One case, admitted moribund, revealed suprarenal hemorrhage on autopsy. Another case, admitted as dysentery, suffered from vomiting, colicky pains in the abdomen, with blood and mucus in the stools, symptoms suggestive of an intussusception; the intense acidity of the urine and the quick response to treatment by alkalies showed the symptoms to be caused by an acidosis of unknown cause. The conclusion is therefore reached that a multitude of causes may combine to upset the normal metabolism of a child and cause acidosis. To prevent wrong diagnoses it is therefore important, in all cases of doubtful origin in children, to examine the urine carefully for diacetic acid, acetone and the bacillus coli.

H. R. M.

Beer, Edwin: Chronic Retention of Urine in Children. (Journal of the American Medical Association, November 13, 1915, p. 1,709.)

The author states that the picture presented in these cases is one suggestive of chronic interstitial nephritis. The patients become pale and pasty. Frequently they are apathetic. Usually there is some difficulty in urination, sometimes pain. In some cases the straining is so great that the patient shows collapse. Symptoms with excessive pallor and weakness. Physical examination shows a globular mass in the hypogastrium; it varies in size, but never disappears spontaneously. If infection is present, the mass may be tender. When a catheter is passed this tumor vanishes. There is regularly residual urine. The walls of the bladder are hypertrophied, though this may not be evident late in the disease when excessive dilatation takes place. On palpation one may feel the bladder contract and become hard, behaving like the pregnant uterus. If no infection has set in, the urine may be clear, suggesting the urine of chronic interstitial nephritis. Eventually all the patients seem to become infected. As a secondary and constant development, the ureter openings become patulous and the ureters dilated, unilateral or bilateral hydronephroses develop and the enlarged kidney or kidneys become palpable. When infection sets in, multiple abscesses develop in the kidneys.

The etiologic factors are as follows:—

(1) Mechanical obstructions. (*a*) Extravesical, as congenital folds and strictures, including tight prepuce, small meatus, etc., new growths. (*b*) Intravesical, as diverticulum of the bladder, vesical stone.

(2) Neuromuscular. (*a*) Brain disease. (*b*) Spinal cord disease. (*c*) Spasticity of sphincter without definite neurologic signs; probably disease of sacral cord.

The author reports 13 cases illustrative of the above etiologic factors. In regard to therapy, mechanical obstruction can usually be obviated. In cases due to neuromuscular cause therapy is hard. Medicinal treatment, for example, potassium iodid, mercury and antispasmodics (papaverin), will have to be tried, together with dilatation of the sphincter; and if all attempts fail, a cystotomy will be indicated, perineal or suprapubic, with section of the bladder's neck. Should a kidney become infected, it should be nephrotomized rather than taken out, whenever feasible, in view of the usual symmetrical development of the disease. H. R. M.

SMITH, W. MITCHELL: A CASE OF PRIMARY BRONCHIAL DIPHTHERIA. (The British Journal of Children's Diseases, November, 1915, p. 331.)

The patient, aged thirteen years, was isolated on April 26th suffering from scarlet fever. The rash on admission was profuse and on April 29th a gland in the right side of the neck was enlarged. The temperature never reached 102°F., and was normal from May 3d onward, except for slight irregular pyrexia between May 13th and 21st. The child was discharged on June 5th. There had been no diphtheria in the ward in which she had been treated. On June 7th she began to feel ill and was remarkably pale. There was a short, hacking cough, which was unproductive, and she spoke in a whisper. There was no stridor and no difficulty in breathing. On examination of the chest attention was immediately drawn to the fact that no breath-sounds could be heard over the right upper lobe anteriorly and that there was a marked diminution of breath-sounds over the corresponding area on the left side. Posteriorly the breath-sounds were normal. The heart was not dilated and the fauces were negative. It was regarded as an early stage of bronchopneumonia until June 8th, when there developed "croup" and marked dyspnea, and pain on the right side and a cast was coughed up. Diphtheria bacilli were found in this. June 9th a similar paroxysm occurred with another cast expectorated. Following this the signs gradually cleared up on the left side after the injection of 6,000 units of antidiphtheritic serum. From the appearance of the casts and the physical signs of obstruction to the upper lobes, it seems probable that the membrane was formed at the bifurcation of the trachea and extended down the two main bronchis. The incidence of primary bronchial diphtherias is sufficiently rare to warrant this article. H. R. M.

IVES, A. W.: DIAGNOSTIC PHENOMENA OF INFANTILE WEAK-MINDEDNESS. (The Detroit Medical Journal, December, 1915, p. 487.)

Ives gives a résumé of the signs of mental deficiency in infants. He points out that the child begins as an idiot, so it is lack of development that should arouse suspicion. The earliest signs of faulty cerebral construction, likely to make itself more manifested later in life, are: lack of attention, failure to notice things, indifference to bad odors, bitter or sour tastes and undue backwardness in nursing. It is suspicious if the child be unduly still or if he be in constant motion, especially in some rhythmic, automatic manner. Infantile or juvenile precocity is a bad omen. Anatomic defects are significant in proportion to their number and prominence. He mentions misshapen head, or ears, asymmetry of features, high arched palate, prognathism, malformed genitals and undue proportion of the length of limbs to body. Failure to support the head, or reach for objects at six months, or inability to sit alone at twelve, or stand after fifteen months, suggest some physical or mental defect.

Cretinism is seldom recognized before the sixth month. The picture is that of an apathetic, quiet baby that seldom cries, with late closing anterior fontanel, non-discernible thyroid gland, large head, broad face and flat nose, thick lips and tongue, late poor teeth, eyes widely separated, a dry, rough skin, coarse, scanty hair and a protuberant abdomen.

The Mongolian idiot can be recognized a few days after birth, with its dark skin, brachycephalic skull, small slanting palpebral fissures, large tongue covered with hypertrophied papillæ. Marked resemblance in a Caucasian to an inferior race is usually accompanied by mental insufficiency.

In the amaurotic type of phrenasthenia there is a weakness of the neck muscles, beginning at a few months, accompanied by dimness of vision and apathy.

Ives, in conclusion, speaks of the large part played by syphilis in faulty mental development and insanity and urges segregation or sterilization of selected cases. M. S.

GROSSMAN, JACOB: FRACTURES OF THE ELBOW. (Medical Record, January 15, 1916, p. 93.)

This paper is based on 50 cases, all treated by the acute flexion position, in which good functionating limbs were obtained in some and a cure, with normal functionating limbs, in the majority. The author draws the following conclusions: (1) Every case of injury to the elbow where the diagnosis is doubtful should be placed in the acute flexion position until the diagnosis is cleared up by the Roentgen ray (except fractures of the olecranon process). (2) Begin massage and passive movements about the tenth day and continue thereafter until the movements in the elbow joint are normal and free from pain. (3) Guard against the displacement of the fragments when passive movements are begun, as faulty reduction causes periosteal proliferation that locks the joint. (4) Proper retention is just as important as proper reduction. H. R. M.

MAXWELL, EUPHAN M.: LYMPHANGIOMA OF THE CONJUNCTIVA. (The British Journal of Children's Diseases, November, 1915, p. 335.)

Two cases of this condition are reported by the author. In one of the cases the exceedingly rare affection of the orbit occurred. It is generally conceded that the predisposition to lymphangioma is present at birth, but that the growth of the tumor is very gradual. This appears to have been the case in both these patients, who were three and three and one-half respectively. In regard to the treatment, most authors are unanimous in recommending electrolysis. This acts presumably by setting up an inflammation which is followed by the formation of connective tissue. X-rays are also of value. H. R. M.

FISHER, G. GARTHWAITE: BRAIN ABSCESS AND SINUS THROMBOSIS COMPLICATING CHRONIC PURULENT OTITIS MEDIA. RECOVERY. (Long Island Medical Journal, January, 1916, p. 34.)

Fisher cites one case, a girl aged nine, whose left ear had discharged intermittently since infancy. For three years prior to hospital admission she had had severe headaches, pain behind the ear and in left forehead. On admission she was having chills. The temperature was 102.5°F. Leukocytes were 24,000. Considerable pain in the abdomen led to suspicion of appendicitis, but laparotomy revealed a normal appendix. For the next two weeks temperature was 99° to 106° F., and at the end of two weeks, though the temperature was subsiding, operation was performed for mastoiditis. Considerable foul pus was found in the mastoid antrum, involvement of the mastoid cells, and a pus pocket behind the lateral sinus in the cerebellar region. The sinus contained blood clots and pus. The internal jugular was ligated, the clots and pus removed by irrigation and a radical mastoid done. The patient made a rapid and uneventful recovery.

M. S.

DUNN, C. H.: SOME STUDIES IN FAT INDIGESTION. (American Journal of Diseases of Children, March, 1915, p. 225.)

Dunn studied the following points: (1) Are there any striking predisposing causes for fat indigestion? (2) Can we successfully compensate for deficient power to digest and absorb fat by increasing the carbohydrates and proteins, and, if so, to what extent? (3) Is the microchemical examination of the stools for fat a reliable guide to the feeding of these infants, and, if so, to what extent? (4) What are the relative values of maltose and lactose as the carbohydrate element in these cases? (5) What are the relatives values of precipitated casein and unmodified protein in these cases? (6) What is the value of lactic acid milk in these cases?

He draws the following conclusions:

(1) Some evidence of syphilis or tuberculosis, especially tuberculosis, was frequently found. In 2 fatal cases tuberculosis was found at necropsy, and in quite a number of other cases there were either a tuberculin reaction, signs in the chest, or a suspicious radiogram. In extremely few instances had the baby

been fed previously with too much fat. As a rule, carbohydrate overfeeding was found, a large proportion of the cases suggesting carbohydrate indigestion. This seems to point to the fact that these cases of atrophy are caused by excessive carbohydrate fermentation, and not to the cow's milk fat or salts. In these cases the carbohydrate injury was primary, but the fat indigestion eventually predominated, tolerance to carbohydrates having been established.

(2) As to how far we can compensate for deficient fat digestion by the giving of more carbohydrates and protein, the author decides that we can to a very slight extent. The majority of the severe cases will not gain on moderate quantities of carbohydrates and protein as a substitute for fat. If these quantities are increased, signs of indigestion appear, several cases showing edema and tetany.

(3) In regard to the microchemical examination of the stools, the author believes that frequent examinations are absolutely essential. No case of fat indigestion can occur without previously finding an excess of soaps in the stools before its occurrence. Excess of soaps, however, is not incompatible with prolonged gain in weight, but is a positive indication for reducing the fat in the food, as eventually a fat upset always occurs.

(4) Conclusions as to the relative value of maltose and lactose as extra sugar added in cases of fat intolerance were as follows: In general, cases of fat indigestion do better with maltose than with lactose. This conclusion, supported by the most consistent evidence, in spite of some contradictions, is that these babies will gain in weight and do well on a smaller quantity of fat when maltose is used. There is little evidence, however, that maltose actually increases the tolerance for fat. It seems to be the best carbohydrate to meet the caloric need created by the fat intolerance; this being due to its being broken down into two molecules of dextrose which is less fermentable, is more easily absorbed than galactose or levulose, and is immediately utilized for energy production without undergoing glycogen storing. It is perhaps due to the fact that it leaves behind less fermentable residue, and consequently less sugar fermentation, that there is a better digestion of fat, granting the theory that sugar indigestion and fermentation is a predisposing cause of fat indigestion.

(5) In regard to the value of precipitated casein, no definite conclusions were reached. In the majority of the cases it had no advantage over the usual protein. The author's results were rather against the rôle of the salts in producing fat indigestion. but this is still an open question.

(6) Nothing definite was decided upon in regard to lactic acid milk.

Conclusions in severe cases of fat indigestion: The milk modifications used must be low in fat, average in carbohydrates, and comparatively high in proteids. The extra sugar should be maltose. A large number of cases can only be saved by breast milk, even a very little being of value. Not more than 7 per cent. of carbohydrate or 3 per cent. of proteid should be given. Whey mixtures are of no help, except sometimes in very young babies who vomit curds. Frequent examinations of the stools should be made for free fat and excessive soaps. It is necessary to reduce the fat, if found in the stools, even if the baby is gaining. H. R. M.

WHIPHAM, T. R.: CONGENITAL HEART-BLOCK. (The British Journal of Children's Diseases, November, 1915, p. 321.)

The author points out that heart-block is now an established fact, occurring in childhood as a result of acute infections, such as pneumonia, diphtheria and rheumatic fever. The occurrence, however, of heart-block as a *congenital* condition has not hitherto been proved by cardiographic methods. When present as a congenital anomaly heart-block is due to a pre-natal malformation of the heart, which gives rise, apparently, to a defect in the development of the auriculo-ventricular bundle, and consequently to an interference with the normal impulses passing from the auricle to the ventricle. Two cases are reported with cardiographic tracings. Both present several points of similarity, being undoubtedly of congenital origin, there having been no cardiac symptoms with the exception of bradycardia and some slight pain around the heart. Both cases have a congenital systolic cardiac murmur heard most distinctly between the apex and the left border of the sternum. The prognosis of these cases is in doubt. There has been no marked cardiac disability in either case as yet. H. R. M.

POLOZKER, I. L.: DISORDERS OF SLEEP, NIGHT TERRORS, PAVOR NOCTURNUS IN INFANCY AND CHILDHOOD. (The Detroit Medical Journal, December, 1915, p. 494.)

Polozker gives the causes of sleeplessness in children as indigestion, overfeeding, chronic dyspepsia, and abdominal dilatation, hunger, earache, anemia, hysteria, exophthalmic goiter, epilepsy, skin affections, severe eczema, intestinal parasites, vulvovaginitis, masturbation, kidney-stone, irritation and the prodrome of tuberculous meningitis.

"The symptomatic form (of night terrors)," he says, "is a sensation of distress arising from digestive disturbances acting through the agency of the vagus nerve. I think all dreams and night terrors are symptomatic, and arise from bodily sensation, but are idiopathic only in the interpretation of the sensation as being the dreamer's own."

The author points out the part played by dreams in the child's psychology and as an etiologic factor in sleep disturbance. Teething disturbs the younger child's sleep; too much school work that of the older child. M. S.

WOODY, SAMUEL S.: INTRAMUSCULAR INJECTION OF ANTITOXIN. (Pennsylvania Medical Journal, December, 1915, p. 176.)

The author bases his paper on 600 consecutive cases of diphtheria of all groups in which the intramuscular injection of antitoxin was employed. Though he concedes that the intravenous administration is followed by more prompt results in the toxic cases, the intramuscular method is simpler to administer, particularly in children, and has many advantages over the subcutaneous. These advantages are: (1) More rapid absorption, hence quicker therapeutic action; (2) need for a smaller dose of antitoxin to produce identical effect in the same patient and therefore (3) economy in use of antitoxin; (4) intramuscular injections are less painful; (5) they are less liable to be followed by abscesses; (6) the technique is quite as simple as that of the subcutaneous injection; (7) there are no unfavorable results of the intramuscular injection which might be considered as contraindications to its use.

The author found that one unit of antitoxin given intramuscularly will do the work of at least two given subcutaneously. The average dose of antitoxin given was 23,800 units, the smallest was 3,300 units and the largest single dose was 100,000 M. F.

ARCHIVES OF PEDIATRICS

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ORIGINAL COMMUNICATIONS

THE PREVENTION OF RESPIRATORY DISEASE IN EARLY LIFE *

BY ROYAL STORRS HAYNES, M.D.
New York City

We have seen, in the past few years, a decrease in the incidence and in the mortality of the diarrheal diseases among infants. Much of the credit for that decrease lies at the door of this Society. The other two important causes of infant mortality, the cases of congenital debility and the respiratory diseases have not as yet shown an appreciable diminution. In fact, one authority claims that, since 1875, the deaths of infants from respiratory diseases have increased 600 per cent.

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* Read before the American Association for the Study and Prevention of Infant Mortality, November 11, 1915.

The widespread prevalence of respiratory disease, and the effect upon the infant of respiratory disease in older children and in adults must be my excuse for presenting to a society avowedly interested in infant mortality some considerations as to the prevention of respiratory disease in early life. Also, many of the circumstances of our daily adult lives, and of our environment which apparently affect the infant little or not at all, yet must be ameliorated if respiratory disease is to be lessened among them, and these we must consider.

Toward the comprehension of respiratory diseases, vital statistics have in the past helped us but little, because the actual morbidity is not expressed in statistics. Most of the respiratory affections end in recovery and few of them are reportable or reported. The amount of injury that is done annually through the medium of the infectious cold alone is almost incalculable. This never fatal illness has among its sequelæ and complications serious and crippling affections such as mastoiditis, rheumatism, endocarditis, nephritis, none of which if fatal would be likely to show to what cause the fatal isssue was primarily due. Moreover, by reason of the reduced vitality which they leave, infectious colds, to take merely one of the class, open the way to other affections or accelerate the progress of organic disease. So the mortality statistics of respiratory diseases, while they present a grave enough problem, do not truly picture the situation. One does not have to be engaged in the practice of medicine, particularly the practice of pediatrics, for many years to have definitely impressed upon his mind that the affections of the respiratory tract are the most frequent and important illnesses which he has to treat. From November to June, excluding the care of nutritional cases, the bulk of his practice has to do with the diseases of the respiratory system.

Respiratory troubles are common at all ages, but notably so in the first five years of life. The deaths from respiratory diseases in this lustrum constitute almost 40 per cent. of the total deaths from these causes, and 25 per cent. of the deaths from respiratory diseases fall in the first year of life. This has changed almost not at all since 1900. Still gives figures from the King's College Hospital showing that of primary bronchitis, occurring in children up to ten years, 52 per cent. occurred under two years, and 34 per cent. under one year; 84 per cent. of cases of bronchopneumonia occurred in the first two years of life; in two other children's hospitals, 50 per cent. and 30 per cent. of lobar pneumonia cases occurred in children under two. Of the affections of the upper respiratory tract we need no figures to have the statement of their great frequency accepted as fact.

The special liability of infants and children under two to respiratory disease is affected during the latter part of the first year by the occurrence of rickets with its debility, its tendency to laryngeal spasm and to thoracic deformity. Later, by the occurrence of measles and whooping cough; and at all times by the common nasal obstruction due to the hypertrophied adenoid tissue. But from birth respiratory diseases begin to be in evidence. Hessthaysen has shown, in a series of thirty-two autopsies on children dying in the first three days of life, that 42 per cent. showed pneumonia at autopsy. This was many times diagnosticated atelectasis. He concludes that the greatest causal factor in these cases of infection must be aspiration of secretions of the birth canal during the second stage of labor. Holt and Babbitt in their investigation of the deaths among 10,000 consecutive births at the Sloane Maternity Hospital called attention to the large number of deaths from pneumonia occurring among the babies under two weeks of age. Nine per cent. of the deaths were due to pneumonia, and 8.6 per cent. due to atelectasis (of which, part, on the basis of Hessthaysen's work, may have been pneumonia). Of these children irrespective of their stay in the hospital, no stay being longer, however, than thirty-two days, Holt and Babbitt record that 17 per cent., more than twice the mortality due to obstetrical accidents, died of pneumonia, the infection being acquired presumably after birth, in the hospital.

There are a number of anatomical factors inherent to infancy and early childhood which make these respiratory affections more frequent and more serious. The narrowness of the respiratory passages tends to interfere with the inspiration of air or even prevent it with the slightest swelling. This is true particularly with the nasal cavities, which are small, corresponding to the small facial part of the head. Here secretions may stagnate and bacteria proliferate with the greatest ease. The larynx, too, is relatively small, the glottis narrow, and the cartilages exceedingly soft and collapsible; tumefaction here is characteristically accompanied by spasmodic contraction. The walls of the bronchi are soft and susceptible to dilation; their caliber is small. The shape of the thorax differs from that of the adult in that the ribs are more horizontal and the thorax assumes somewhat the position of inspiration; hence the respiratory excursion is relatively short. The ribs are soft and do not afford a good basis for the contraction of the respiratory muscles, particularly those of expiration. Hence the cough is feeble and the secretions are not expelled. Further, the commonly recumbent position of the infant causes the abdominal organs to gravitate toward the head and to encroach upon the capacity of the thorax.

The young infant presents toward disease a certain resistance due to the natural defenses of the body, the phagocytes and the substances in the blood serum. To these, there has been added a certain degree of conferred immunity from the blood serum of the mother, through the placental circulation, and from the maternal milk, particularly the colostrum, which has been shown to transfer immune bodies in much greater amount than later milk and whose chemical resemblance to the blood serum may have an importance in this connection.

For the initiation of a respiratory disease we have to presuppose the lowering of resistance by one or more of the factors which cause lowered resistance to disease at all ages. These are, principally, exposure to cold, fatigue, autointoxication, poisoning by food or chemicals. To all these the infant is passive. He cannot protect himself. He has to be cared for. He is "an infant crying in the night . . . and with no language but a cry." Exposure to cold is particularly liable to occur unless extreme care is exercised. The infant has a greater amount of radiating surface in proportion to his mass, which represents his heat production and he is therefore more liable to chilling than a bigger bodied individual. In the normal infant or child, the bacteria which he meets in the air or in the cough spray of infected persons are filtered out by the nasal mucous membrane and killed by the nasal mucus; or, if they get into the bronchi, are wafted back by the waves of the cilia. Exposure to cold and chilling upset this mechanism. McFie says that cold may cool the blood to such an extent as to diminish the bactericidal activity of the phagocytes and the vitality of the cells that line the respiratory tract and that the mucus itself may lose its bactericidal power. To the factors of autointoxication, food poisoning, etc., the infant is greatly exposed if he be bottle rather than breast-fed, for he encounters the greater liability to accident of the artificial method, and lacks the immune substances which he would get from his mother's breast.

The infant, too, in unenlightened homes is liable to be kept in too warm rooms and in too many clothes.

In other respects, the general factors governing the occurrence of respiratory diseases at all ages obtain in the infant. The ordinary organisms, the pneumococcus, the staphylococcus, the streptococcus, the influenza bacillus, the micrococcus catarrhalis, and the Friedlander bacillus play their rôle. From the mouth or nose of the infected person they are projected on the particles of cough spray to float for a while in the air and then sink to the ground to become dried out into dust. As they float in the air, they may be inhaled and initiate a respiratory infection. This is not very likely, unless the two individuals concerned are close together, for the dilution is great, and greater as the distance is increased. In the dust of the street, through the agency of the sunlight and fresh air, the bacteria quickly die, so that although here again they may come into contact with a susceptible mucous membrane and proliferate, they are not so likely to do so as was once thought. In the house, in dark places and in damp places they are more viable. The dampness, however, which helps their growth also hinders their rising into the air, so that aerial infection in any form is rather less than probable. Ejected in larger amounts in the sputum or the secretions of the mouth, upon handkerchiefs, bedclothes, etc., or transferred from one person to another by kissing or by any other contact, particularly that of the hands, they may live usually in sufficient numbers to infect, or if few, they may be, because of having passed through a susceptible individual, of sufficiently enhanced virulence to do so. Contact, direct or mediate, is the principal means by which these diseases are carried on.

We have then the problem of preventing infection in a group of individuals, anatomically easy to infect, susceptible because of their age and certain of their ailments, endangered because of their very helplessness and passivity; that is, we have the problem of keeping infants and young children at their highest point of resistance and out of contact with the provocative agents of respiratory disease.

How are we going to do it?

In the general environment in which we live there are factors which react unfavorably toward the prevention of respiratory diseases and which should be overcome.

First, the nuisance of dust. We do not now fear dust as we did ten years ago as a carrier of bacteria; but dust yet has its victims. The increased traffic in our streets, and the higher velocity of wind favored by taller buildings have increased the amount of dust present in the atmosphere at all times. Dust *may* be a direct carrier of infection: it is, however, deleterious chiefly from its irritant effect upon the mucous membrane of the respiratory tract. Dust should be prevented out of doors by proper watering and oiling of the roadways and in large cities by the elimination of the horse whose excrement dried and pulverized constitutes a large part of the dust we breathe.

Dust is always more abundant in the air of the house than in that of out of doors and it further is more liable to contain viable organisms indoors, because of the absence of sunlight. Housekeeping which simply passes the precipitated dust from one place to another is antiquated and dangerous. Vacuum cleaners, dustless dusters, wet sweeping with aid of some of the dust laying powders now available, the use of rugs instead of carpets all will help against this nuisance. The dust that is dried sputum must be prevented by preventing spitting.

The smoke of our large cities has much to do with the prevalence of respiratory diseases and it should be abated. It is the unattractive accompaniment of industrial progress and has without doubt had its effect in increasing the mortality and morbidity of respiratory diseases in industrial centers as contrasted with rural communities. In most of our large cities it is abundant. In some, as Pittsburgh and London, it is characteristic. Of London, Hopkinson Smith, when making charcoal sketches of certain parts of it, said, to show the propriety of his medium, "London is charcoal, and charcoal is London."

Smoke does not carry bacteria; it does its harm through the carbon it deposits in the lungs, because of the irritant and corrosive effects of the sulphur acids it contains, because of its blackness which shuts out a considerable amount of sunlight so necessary for healthful living and the destruction of bacteria. The absence of a normal amount of light in the environment has been found by Weber to give rise to symptoms comparable to those of a close atmosphere, that is, loss of energy, depression of spirits and lack of appetite. Smoke is also a direct inciter of fogs. Fogs are injurious, because at low temperature their absorption of heat chills both body and respiratory mucous membrane, while in warm weather, a foggy atmosphere being near saturation interferes with the evaporation of moisture and the elimination of body heat. In London, 20 per cent. of fogs are said to be unnecessary and caused by smoke.

Dr. W. C. White has shown in an exceedingly interesting survey of conditions in Pittsburgh relating to pneumonia, there very virulent, that in certain wards of the city where the smoke was abundant and the dust fall high, there too the pneumonia mortality was high, while the wards of the city which were freer of smoke were freer of deaths from pneumonia. He attributes this correspondence to the irritant effect of smoke upon the mucous membrane of the lungs.

Departments of health and municipal authorities should meet the evil of smoke as well as the fumes and vapors from manufacturing plants, sugar refineries, gas works, smelters, etc., by making and enforcing adequate legislation.

Crowding, whether it be in tenement homes, in street cars or subway trains, in theatres or in churches, takes its toll of respiratory disease and death. Wherever people congregate in numbers there will be an opportunity for individuals with active respiratory disease to transmit it. A cough or a sneeze by a person with coryza in a crowded subway train fills the air with droplets carrying bacteria which can be inhaled by many people in quantities large enough for infection. In New York City, the epidemics of acute respiratory disease which sweep over the city periodically, affecting children in widely separated districts, are without doubt due to their transmission in the crowded cars of the great arteries of travel, which carry hundreds of thousands of people daily. The close contact of life in a two-room tenement favors respiratory disease in the little ones; and it is interesting to see that in spite of the readiness with which respiratory disease spreads to every member of the family, it does not spread nearly as readily from family to family or from floor to floor, showing that some closeness of contact is necessary.

The regulation of the two contagious diseases, measles and whooping cough, which predispose to respiratory affections, is a matter of general sanitary control of the utmost importance. There is little doubt that the mortality statistics of respiratory diseases would be swelled at least 10 per cent. if the deaths really due to this cause but classified as due to measles and whooping cough were included, for almost all the deaths of measles and whooping cough are due to bronchopneumonia. The danger to infants and children from these two diseases is much greater than it need be. We have a lot of educating yet to do before physicians and laymen realize the true seriousness of these two diseases and are willing and trained to coöperate in measures which really will control them. In the case of measles, the emphasis in prevention should be placed not so much on disinfection or the duration of quarantine as upon the early detection and the early quarantine of cases; upon the isolation of susceptible contacts; and upon the necessity of suspecting every case of weeping coryza to be an incipient case of measles. Whooping cough should have much more serious consideration by health authorities; not to report it should be made a misdemeanor; the burden of reporting it should be upon both the physician and the parent; its victims should be compelled to wear some distinguishing garment; cases should not be permitted by the health authorities to run their course, even if mild, without medical superintendence, particular attention should be given to educating in regard to its dangers parents of children affected, and finally hospital provision should be made for the care of its complicated cases.

We demand hospital care for these children with respiratory disease; and yet, in some respects, the hospital is a dangerous place. Respiratory disease originating indoors is peculiarly fatal and is liable to rapid and extensive spread. In a series of figures at one hospital, of cases of lobar pneumonia on admission, the mortality was 1.9 per cent; of bronchopneumonia admitted ill, 52.5 per cent.; of bronchopneumonia acquired within the walls, 81 per cent. Chappell and Brown in a study of respiratory infections in infants' wards at the Babies' Hospital, New York, give figures closely corresponding to this. The figures of Holt and Babbitt, already quoted, show what may happen from crowded nurseries and close intermingling of newborn infants.

Yet the hospital has done much to show both how infections, and respiratory infections among them, are transmitted and how their transmission may be prevented. Following Grancher, who first had the courage to treat in one ward various infectious and contagious diseases, upon the plan of separation of patient from patient and of careful cleanliness upon the part of the nursing staff, hospitals abroad and at home have attained a marked success in the care of communicable diseases without the occurrence of cross infection. Whether the plan be a series of rooms opening upon a common corridor—the box system—a series of partitions separating the ward space into cubicles, the interposition of a screen covered with a sheet moistened with antiseptic, a metal grille surrounding the bed, or, simplest of all, a *barrière* of a tape so stretched as to mark out the forbidden area, the results have been, barring accidents, pretty uniformly favorable and encouraging. This success seems to depend entirely upon the excellence of the "aseptic nursing" which is the necessary accompaniment of the barriers. In those institutions where time and careful instruction have been given to the training of the attendants, the success has been greatest. Respiratory diseases seem possibly more difficult to control in this manner than other readily communicable diseases. Measles has been regarded as almost impossible to restrain and has been used as an example of aerial transmission. The view is probably correct that the infecting agent of measles is extremely difficult to remove from the hands and fomites and so is transmitted by contact. The same may possibly be true with respiratory infections, but wherever cross infections are numerous and respiratory deaths occur in large numbers, that institution must be considered to have a careless technique. The attendants do not take sufficient care, or they themselves may be carriers. No hospital attendant should be on duty who is not both rested and well.

It is a question whether a child with a respiratory affection should ever be permitted to attend school. There is really no such thing as "a little cold." The child who is exposed to "a little cold" may develop pneumonia and die. The class into which the child with the "little cold" comes may be deprived of an aggregate of many weeks' schooling, because that child was not excluded, as he should have been, and the little brothers and sisters of the infected child and of his infected classmates, with whom we are particularly concerned, may never live to bring their "little colds" to any school. Here too, the attendant, the teacher, should never be on duty with any sort of respiratory difficulty. The open-air school and the open-window school besides their many other beneficial results have contributed to lower, to a marked degree, the number of cases of respiratory trouble among their scholars.

In the home must be accomplished the greatest amount of actual preventive work, because there the resistance of the individual can be built up through proper care and hygiene, upon which, more than upon anything else, the success of preventive measures lies.

The treatment of the individual already sick calls for proper isolation; for care in the disposal of the discharges of the mouth, nose and throat; handkerchiefs and cuspidors are to be dispensed with; gauze wipes or paper handkerchiefs to be used and burned. The patient's clothing and bedclothes and eating utensils must be disinfected; the attendant must wash her hands, prevent infectious material being carried on her person, and disinfect her mouth and throat.

It is a moot question whether disinfection after illness is necessary; but it will do no harm. What is necessary without doubt is a thorough cleansing of the room in which anyone has been ill with respiratory trouble with soap and water, sunlight and fresh air.

An interesting experiment at Dartmouth College shows that the periodical attempt at disinfection of class-rooms and assembly-rooms, where the movement of crowds stirs up dust and where darkness favors the viability of organisms, may lower the incidence of disease. It was found on taking cultures of the air of class-rooms that they often showed high bacterial counts. An arbitrary standard was set for the indication to disinfect the rooms. During the year before this went into effect, of 850 men 131 or 15 per cent. had colds or influenza; the next year with this plan in operation, 1,229 men had 32 colds or cases of influenza, or 2.5 per cent.

If infants and young children are to escape respiratory diseases, the utmost care must be taken in regard to daily hygiene in order to conserve their powers of resistance. The factors of food, clothing, sleep, the air they breathe, the temperature in which they live, their baths, their going out, all must be regulated along preventive lines.

Infants and young children must have suitable food in amounts sufficient to supply their need for energy, heat and growth. Pestilence follows famine and the terrible need of the poor in our great cities during last winter has been apparent to us all in the increased respiratory mortality noted throughout the year. No doubt this increased mortality was due partly to lack of fuel and clothing and to overcrowding; but too little food is the foundation upon which they all rest. In our dispensaries, the histories elicited last winter showed most pitifully the deprivations which were being met by the dispensary class, because the father was out of work and there was no money to buy bread. Unemployment must be attacked in the prevention of respiratory diseases.

Too much food may likewise be bad, for it necessitates the production of a larger amount of body heat and the dissipation of it; this may disturb the heat balance and favor infection.

Inasmuch as the school child brings home disease which being hungry has helped him to acquire, school lunches may play an important part in our campaign.

The clothing of the young child should protect him from chilling and permit escape of his self-generated heat. In cold weather, socks and bare knees are objectionable, as the body surface which is habitually chilled loses in time its ability to respond to cold by the dilatation of its superficial vessels, so that the temperature may be lowered and with it the resistance of the individual. However, in the majority of instances, clothing needs to be taken off children rather than put on, for the zealous mother is overstrenuous in this regard. The proper functioning of the skin demands adequate dissipation of the body heat. This is accomplished by heat transfer and evaporation. Heat transfer (radiation and conduction) serves until it does not work rapidly enough. Then evaporation of perspiration abstracts a large amount of heat, rendering it latent in water vapor. Too warm clothing limits heat transfer. The body heat then rises and perspiration ensues. With non-absorbent clothing it is evaporated with difficulty or not at all and the body is bathed in warm, moist air which prevents the further elimination of heat, endangers the general health and in the long run weakens the vasomotor mechanism of the skin, so that the normal responses to heat and cold are less active than normal and the individual loses in resistance. Sleeplessness, restlessness and irritability are signs of discomfort in the infant who is overclothed. A suitable clothing for next the skin is one which will permit of slow radiation of heat and a rapid evaporation of moisture. By this means the skin is kept dry and warm but not hot. The skin reacts properly to stimuli of cold and heat, the vasomotor tone is maintained and resistance is heightened.

Loss of sleep is a great factor in the causation of respiratory diseases. It is not usually common in childhood except as a result of illness or indigestion; but such illnesses or indigestion as occur contribute to the occurrence of respiratory disease. Hence great care must be taken in the treatment of illness to manage so that the greatest amount of sleep may be secured; quiet should obtain in the sick-room and about the house; food and medicine should be given so that as few periods of disturbance shall occur as possible. In connection with sleep, one factor is of extreme importance. The functions of heat regulation and heat production, at best but poorly developed in early life, are during sleep and anesthesia more or less in abeyance. The individual approaches the condition of a cold-blooded animal and his body temperature fluctuates with the temperature to which he is exposed. So it is particularly important to see that during sleep children are warmly enough clad, especially in the early hours of the morning.

We are all advocates of fresh air, but our ideas as to the efficacy of ventilation have changed. It is not necessarily new air that we require. The CO_2 and the "crowd poisons" need not trouble us if by motion and low temperature the heat of the body is removed. This does not mean that we do not benefit from "fresh, cool flowing air." We do. Man has resided in the open air many centuries and his skin reflexes work best with a full perflation of air. Thus he is best conditioned to resist disease. Sometime, ages hence, our reflexes may work better indoors. Now, the nearer we approach outdoor life and air, the better will our defenses be. For the ill effects of badly ventilated rooms come not from the "vitiated" air of these rooms, but from the fact that in a stagnant atmosphere the body cannot "unwarm" itself. In a room in which the air is not frequently renewed or artificially cooled and set in motion, it quickly becomes warmed from the heat transfer of the body. As the temperature approaches that of the body the air can absorb less heat and perspiration follows. If the air be still, there soon accumulates about the body a layer of warm, moist air which cloaks it and prevents the elimination of heat, so that all the effects of too much clothing are apparent. If the air be set in motion comfort is restored even in air containing twenty times the amount of carbon dioxide ever found in badly ventilated houses.

The regulation of the heat and humidity of the atmosphere of houses is important. Our houses are too hot. They are too dry. They resemble the atmospheric conditions of the deserts, while outdoors the air may be cold and damp from an east wind blowing off the ocean. The room heated to 72° F. with a relative humidity of 25 per cent. seems colder to the body than 65° F. with a humidity of 50-60 per cent. and it has disastrous effects upon the respiratory mucous membrane, from which it abstracts moisture to partly make up its deficiency. Prolonged stay in such an atmosphere makes transition to a cold, damp air dangerous, because of the congestion which the cold causes and the chilling of the relaxed and congested mucous membrane by the heat-abstracting power of the cold dampness. It may be that adenoids are due to the artificial heating of our houses and their lack of moisture. They have become fearfully abundant in the half century or more during which central heating has been in general use.

A house kept at 65° F. with a humidity of 60 per cent. will be a house comfortable in the coolest weather and nearly free from respiratory disease. As a patient said to me recently: "Two years ago we had a poor furnace and could hardly keep warm, but we didn't have a cold all winter. Now we have a wonderful furnace and we have one cold after another."

Going out brings up again chilling and the moisture factor of the atmosphere. Cold, damp, windy days predispose to respiratory difficulty, because of the danger that children will become too cold. Cold dampness quickly removes the heat from the clothing. Wind removes heat very rapidly by replacement of air. On a combination of windy and damp days the result is multiplied and it is in such weather that the greatest number of cases of respiratory disease arise. To prevent the bad effects of such days children should be warmly clothed and on wet, windy days an overgarment of light windproof, waterproof material would serve better to keep the heat in than the heaviest woolen. Such a garment for the poor might be of oilcloth.

A properly functionating skin is a clean skin. Baths prevent respiratory disease. Cold sponging helps to "harden" children because it gives exercise to the vasomotor system and keeps it active. This could be accomplished as is done by the Japanese by very hot baths of short duration, which have a stimulating effect similar to that of cold. There is greater danger, however, that hot baths will be too prolonged.

The prevention of constipation is an important work toward the aim we have in view. Clinically, constipation alone or in combination with fatigue, loss of sleep and exposure, is present in the etiology of almost all respiratory affections, particularly infectious colds.

By way of medical intervention, several avenues for prevention present themselves. Vaccines have been recommended to raise the individual resistance toward the bacteria accompanying colds. Allen in 1908 called attention to this method and claimed then as he has since that excellent results may be obtained in this manner. Favorable reports have appeared now and again and the method may have a future. It is subject to the possibility that the organisms causing the next cold will not be identical with any toward which the individual's immunity has been raised.

The presence of adenoids and tonsils is so great a menace to the continued prevalence of respiratory affections that their removal should be recommended whenever they cause symptoms. Mouth-breathing shunts the air around the nasal mucous membrane. It is not cleaned nor warmed nor moistened as it should be and the result must be a lowered resistance upon the part of the bronchial membrane.

The bacteria which cause respiratory disease, when they do have a habitat in the body, usually reside in the mouth. The nasal cavities in health, and the pharynx and larynx cavities whose secretion is almost wholly pure mucus are usually nearly if not quite sterile by virtue of the bactericidal qualities of the mucus, which seems to be an ideal substance for protection against bacteria and for lubrication. The mouth on the other hand teems with bacteria, which grow well there. The bactericidal qualities of the buccal mucus are not so manifest and there is constantly present food stuff and sometimes decaying matter in the cavities or around the roots of teeth.

Mouth disinfection should be attempted. Wadsworth in 1906, in working against the pneumococcus, produced a mouth wash which was alkaline, dissolvent of mucus, non-irritating, bactericidal and which may be used prophylactically with benefit.

The consideration of all these factors leads us back to the realization that in the prevention of respiratory diseases, as in other infectious processes, there are two principal factors: (1) the destruction or exclusion of the infecting organism and (2) the preservation of the resistance of the individual, of which the second is now recognized as being by far the more important.

We see in connection with the first condition that transference by contact is the method in most cases and that it may be avoided by real cleanliness.

We see in connection with the second that the preservation of a perfectly functionating vasomotor system is of the greatest importance in the protection of the individual against the physical enemies of his environment; that the accumulation of the products of fatigue and intoxication must be prevented if the natural defenses of the body are to be adequate.

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RELATION OF THE BLOOD CONDITION AND THE CONSTITUTION TO THE WEIGHT AND NUTRITION OF THE CHILD—A. O. Karnitsky (Jahrb. f. Kinderhk., October 6, 1914) studied 80 children whom he was able to observe from birth, 52 for the age during which nursing is carried on, and 93 older children. He concludes that the growth of the body ends at the seventeenth to the eighteenth year. There are several types of growth and development—the normal, euplasia; the increased, hyperplasia; and the delayed, hypoplasia. In the normal type the quantitative and qualitative growth and development forms a curve which follows that of the body-weight and blood curve. In pathological forms of growth there is no such parallelism of the weight, nutrition and blood quality; weight and blood quality show qualitative and quantitative variations which may be grouped as follows: (1) Without notable disturbance of the correlative function in the growing organism of the child. (2) With marked disturbances of the correlation between weight, nourishment and blood condition. A properly cared-for and breast-fed child will show no variation of the weight curve from the normal. The eruption of the teeth is a physiological act and produces no disturbances of health of any kind. In children from six months to two years of age there is a regular increase in the quality of the blood. The minimal, maximal and medium number of red cells and hemoglobin content of the blood must be considered in relation to the health and constitution of the child under observation.—*The American Journal of Obstetrics.*

INSTITUTIONS AS FOSTER MOTHERS FOR INFANTS*

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There is no doubt that the mortality in institutions housing infants has been not only great, but appalling. Pediatrists have been cognizant of this unhappy condition for many years, but it is only lately that it has become general knowledge not only among the medical profession, but among the laity as well. When we are informed by Van Ingen that in two large institutions over 50 per cent. of all the babies admitted died before they were two years of age,[1] and we read in a recent report published by this Association that in another asylum over one-fifth died before completing their first month of residence, and over a third before completing their second month,[2] we realize that this is a most serious situation, and one demanding immediate investigation and correction. Nor can we condone this state of affairs in the belief that these statistics refer to the newborn and to very young infants, for upon looking further into this report we find that of infants committed when they were three to four months of age, 40 per cent. died, and of those between the ages of six and eight months, about one-third died. It is therefore not surprising that an increasing lack of confidence has developed in the usefulness of all institutions whose function it is to care for infants and young children.

The fundamental point in an inquiry into this question should be whether there is anything essentially wrong in the system, or whether the high death rate in these institutions is dependent rather on the method of their administration. If the system is at fault, then, as Chapin says,[3] "the infant asylum must go." If, however, the system is capable of being satisfactorily administered, then what is needed is not the demolition but the reorganization of the asylum. It should be noted that in approaching this subject from this point of view, we are assuming the burden of proof and taking it for granted that a high death rate does not and cannot occur when infants are cared for according to the alternative method—the boarding out in homes.

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* Read before the American Association for the Study and Prevention of Infant Mortality, November 11, 1915.

There are as yet no statistics on the "boarding-out" system, so that it is impossible to judge whether this premise is true, whether it is indeed a system possessing inherent virtues. The reason why statistics are lacking is because in almost every organization a combined boarding-out and asylum system is in vogue. Often the healthy babies are boarded out and admitted to the institution only when they are ill or in need of special care. It is thus patent that unless very great care were exercised in compiling the data, the results in the homes would appear most excellent, and the mortality in the institutions excessively high.* Indeed, it is due to this very factor of error that some of the percentages which I have quoted have reached such large proportions, for they relate to institutions which make use of the combined system.

The opinions which I hold on this subject are based upon an experience extending over a period of almost five years with the care of the inmates of the Hebrew Infant Asylum of New York, a service which I share with Dr. Sidney Haas. This institution harbors about 400 children under the age of five years, who have been committed by the city to its care, generally on account of the death or the destitution of their parents. There are no "born-in" babies and no mothers. All children are accepted who are not suffering from an acute or communicable illness, whether they are thriving or poorly nourished. If not claimed by relatives, they are retained until they have reached the age limit, when they are transferred to the orphan asylums. The number of infants must necessarily vary at different times. However, the average census under the age of one year is about fifty, with about an equal number between the ages of one and two years. I have gathered together the vital statistics of these infants so as to obtain an insight into the measure of our success and failure during this five-year period, and at the same time gain a practical viewpoint of this entire question. On attempting to arrange figures of this kind, one is at once confronted with unexpected difficulties. In an effort to acquire a satisfactory method of computing the mortality, I appealed to the Children's Bureau at Washington and to the statistician of the State Department of Health, only to learn that I was presenting a "problem of great complexity" and one which they felt themselves unable to solve. It is therefore to be hoped that the Committee on Statistics of this Association will continue their efforts so that a generally accepted statistical form will be available for all child-caring institutions.

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* In computing the mortality rate in institutions, this principle should be followed, and all deaths included of cases transferred to other hospitals, for infectious diseases, etc. This rule has been followed in our computations.

It has been stated by many that for some peculiar reason infants cannot thrive in an institution; that, although they enter as healthy, well-nourished babies, within the course of some months they grow pale and weakly, and, in the majority of instances, die. The cause of this peculiar loss of vitality is variously explained, and quite commonly is summed up under the general term "hospitalism." With this point of view in mind, I have prepared a table (Table 1) in order to ascertain what has been our experience in this respect. This table, which may be termed a "vitality table," shows what has happened to all the infants admitted to our institution during the past five years, grouping them in two divisions—those committed under six months of age, and those committed between the ages of six months and one year. Some of these children returned to their homes or to other institutions; some died in our institution, and the rest are in the asylum at the present time. It is hardly necessary to discuss this table in detail; it is presented to emphasize one fact, namely, that infants can be successfully reared in an institution. The fact that 106 children in the asylum, that is to

TABLE 1. SUBSEQUENT HISTORY OF INFANTS UNDER ONE YEAR ADMITTED TO ASYLUM FROM 1911 TO 1915.

A. ADMITTED UNDER 6 MOS. OF AGE.

	Length of Stay in Institution.					
	Less than 3 mos.	3-6 mos.	6-12 mos.	1-2 yrs.	2-5 yrs.	Total.
Returned to homes, etc.	25	12	12	24	4	77
Died	30	12	10	2	....	54
Remaining in Asylum	9	14	21	34	28	108*
Total	....	....	....	....	....	237
B. ADMITTED 6-12 MOS. OF AGE						
Returned to Homes, etc..	27	17	14	9	3	70
Died	8	4	3	1	....	16
Remaining in Asylum	4	3	18	12	17	54
Total	....	....	....	....	....	140

say, one-fourth of our population, were admitted as infants under six months of age, and that 162, or two-fifths of our present census, were admitted under the age of one year, shows that infants can reach childhood in an asylum. These infants do not develop into the wan, marasmic babies so commonly associated in our minds with such institutions, as may be judged from the data of infants reported in Table 2. These are not selected cases, but a complete list of infants under one year of age admitted to the institution from May to the end of September of this year. It will be noted that the roster includes many underweight babies, which, it should be added, were suffering from marasmus and rickets. In every instance they immediately gained in weight; one subsequently died of pneumonia. They were cared for in the cubicle ward, to which all babies under nine months of age are assigned on admission.

TABLE 2. GAIN IN WEIGHT OF INFANTS AFTER SOME MONTHS IN ASYLUM.

Date of Admission (1915).	Age (mos.) on Admission.	Wght. (lbs.) on Admission.	Wght. in Asylum Oct. 4, 1915.	Remarks.
1. May 4,	4	13	20	
2. May 15,	2	8	15½	
3. July 13,	9	17	21	Rickets and Bronchitis.
4. July 23,	¾	6	9½	Not given breast milk.
5. July 15,	9	17	21	
6. Aug. 2,	1½	6¼	9½	
7. Aug. 2,	3	9	12¾	
8. Aug. 2,	¾	8	11¾	Not given breast milk.
9. Aug. 17,	3	8	10¾	Rickets, Bronchitis.
10. Aug. 18,	6	8	11	Pertussis.
11. Aug. 18,	2	8	11	
12. Aug. 21,	3	7	8½	Rickets, given some breast milk.
13. Aug. 28,	4	9½	10¾	Rickets, Bronchitis.
14. Sept. 1,	4½	6	7	Marasmus, given some breast milk.
15. Sept. 23,	6	10	10½	Marasmus.
16. Sept. 28,	6	10	Died.	Rickets.

Table 3 gives in summarized form the mortality among our infants under two years of age from 1911 to 1915. It will be seen that the mortality rate in relation to infants committed has been somewhat over 16 per cent. among those under one year, and 8 per cent. among those between one and two years of age. Although this mortality is higher than has been our experience in the past two years, it is markedly low when compared with the figures cited in the beginning of this article. It should be added, however, that this method of computing the mortality rate harbors a considerable possibility of error, for it is evident that if children are committed to an institution in large numbers and remain there but a short while, so that the total number of commitments is large, the mortality will be far less than in an institution where few children are committed, but are kept for a long period. In our institution the commitments are few. Accordingly, for the year 1914 we added a second method (as shown in Table 3) of computing mortality. We have made a total of the number of days' institutional care that children of certain ages have received. For example, in this year infants under six months received 7,424 days' care, and those from six to twelve months of age over 13,000 days. As there were fifteen deaths under the age of six months in the course of the year, we had one death for every 494 days' care of infants of this age. The further details of this computation may be seen in the accompanying table. (Table 3.)

TABLE 3. MORTALITY OF INFANTS UNDER TWO YEARS (1911-1915).

A. 1911-1915.

	Committed.	Died.	Death Rate.
Under 1 year..........................	380	62	16.3%
1-2 years	203	17	8 %

B. MORTALITY ACCORDING TO AGES

	Under 1 mo.	1-2 mos.	2-3 mos.	3-6 mos.	6-9 mos.	9-12 mos.	1-1½ yrs.	1½-2 yrs.	Total.
No. of Admissions.......	69	54	40	76	80	61	122	81	583
No. of Deaths...........	6	2	4	22	13	15	11	6	79

C. MORTALITY 1914 (COMPUTED ACCORDING TO TOTAL NO. OF DAYS' CARE).

	Total No. Infants.	Total No. Days' Care.	Total No. Deaths.	Death Ratio.
Under 6 mos..................	87	7,424	15	1 :494 days.
6-12 mos.	64	13,234	7	1 :1,890 days.

A perusal of these four tables should make it clear that infants can be reared for years in an institution; that they can thrive amid these surroundings, and that, although infant mortality remains an ever acute problem, it does not need to reach the excessive proportions which it has at times attained. The next step we cannot make, namely, a comparison with some other method. However, as will be noted below, there is reason for believing that babies which are boarded out may not infrequently fare worse.

A few words as to the plan and organization of the asylum may be of interest. There are three wards for infants: two of these are large rooms accommodating twenty to twenty-five infants, and the other is a cubicle system, containing twelve glass-partitioned rooms for an equal number of babies. The cubic space is about 450 feet per baby in all three wards, and yet the results in the cubicles far exceed those attained in the wards, demonstrating that the number of cubic feet is only one of many factors which enter into the welfare of the infant. The nursing staff is composed of nursery maids who come to us untrained to receive a nine months' course of instruction, and of permanent and more experienced nurses who are in charge of the wards. The nursing may be characterized as only fair, for its quality could be decidedly improved. There is one nurse to about 5 infants by day, and 1 to 10 or 12 infants at night. The asylum is housed in a modern building, which has free access of air, and all wards are equipped with balconies for the babies or young children. There is, naturally, a milk laboratory in the institution for preparing the food for the babies, which allows the most advanced methods of infant feeding to be put into practice. Recently, Dr. Leopold of our staff has obtained considerable success with the use of Schloss milk, and, at present, Dr. Riesenfeld is making a practical test of the milk devised and recommended by Friedenthal. We have at all times one wet nurse in the institution, who frequently supplies milk as part feeding to two or three babies.

As you are well aware, summer diarrhea has become decidedly less frequent during the past few years in New York and many of the other larger cities. This has likewise been our experience in the asylum, so that we no longer dread the summer months and the heat. In fact, remarkable as it may seem, our mortality is lowest during the summer season. I have prepared a table (Table 4) which brings out this interesting fact in sharp relief. Here we see the deaths occurring during the years 1913, 1914 and 1915, arranged according to the months in which they occurred. This table includes all the deaths among our children, both those taking place in the institution, as well as those which occurred in the hospitals for contagious diseases, or other hospitals to which children were transferred. All but one of these children were under two years of age. The significant fact is that *during a period embracing three years we had a total of but five deaths during the four hottest months of the year,* and that the mortality was considerably higher invariably during the winter months. In other words, we have to dread not summer complaint, but *winter complaint.* This winter mortality is the result of pneumonia. These pneumonias have their beginnings in the simple every-day coryza or colds, which, unless they are quickly noted and appreciated, and unless decided measures are enforced to prevent contagion, may reach epidemic proportions. This is the disease of infants which, for a better title, has been termed "grippe," and which is characterized by its many complications, including besides pneumonia, otitis, nephritis, and serious gastrointestinal disturbances. This infectious disease constitutes at present the most important medical problem for those who are caring for young infants in institutions. It should and must be eradicated, as has been summer complaint. We have been making every effort to this end, but, as our records show, have achieved only partial success. As the measures which we enforce may be of value to those who no doubt are contending with this same difficulty, we shall review briefly some of our regulations in this connection. Any nurse who has a cold or

TABLE 4. DISTRIBUTION OF MORTALITY ACCORDING TO MONTHS. "WINTER COMPLAINT" NOT "SUMMER COMPLAINT."

	No. of Deaths 1913.	No. of Deaths 1914.	No. of Deaths 1915.
January	5	2	1
February	1	6	1
March	2	4	5*
April	5	5	1*
May	2	0	2*
June	1	0	0
July	1	1	0
August	1	0	0
September	..	1	0
October	3	4	1
November	4	1	..
December	1	2	..

* Includes one case of tuberculosis.

rhinitis is temporarily debarred from service in the infants' wards. When physicians have colds they make it a practice when visiting these wards to examine the infants as little as possible. In fact, it is a general rule that the babies should be handled only when necessary. They are not to be petted. In this respect we differ absolutely from those who believe that the "mothering" of infants is necessary, and that the reason why babies do not thrive in institutions is because they miss this mothering. On the contrary, this handling or mothering spreads the grippe infection, just as it disseminates measles or other communicable diseases, which are probably conveyed, to a large extent, by direct contact. Another factor of importance in preventing the spread of this respiratory infection is that there should not only be sufficient cubic space in the wards and that the cribs should not be crowded closely together, but that there should be likewise sufficient cubic space in the dressing rooms where the infants are diapered and bathed. In planning infant asylums, the dressing rooms should be made proportionate to the size of the ward and the tables should be arranged so as to avoid close contact. Furthermore, experience has taught us that infants and runabout children cannot be safely housed in the same wards, even for a short period. Until a few years ago we had infants and children of this age in the same ward in our admitting pavillion, and the result was that during this period of three weeks the infants almost invariably developed colds and suffered the consequences. Since we have segregated the infants, however, not only in the main institution, but also in the admitting pavilion, our results have improved decidedly. It would seem that one of the reasons why some are of the opinion that infants cannot be reared in institutions is because they draw the analogy from their sad experience in hospitals, where they have found that healthy infants, lying among the sick, in the course of time invariably contract some disease from their neighbors.

As we have said, the alternative method of caring for infants is to board them out. As you know, the Department of Health of New York City licenses a large number of women, after investigating their characters and their homes, to care for one or more babies. It is very evident that a method of this kind can never be uniform, that of necessity there will be good foster mothers and poor foster mothers, and that, unless it is carried on under the closest surveillance, great abuses may creep in. Although my experience with this method is limited, I am able to state from experience that some of these mothers are by no means the type of women who should be entrusted with the care of infants. Is it realized by those who are so confidently urging the adoption of the boarding-out system to the exclusion of all others, that they are at one stroke casting to the winds the hard-earned knowledge of modern or scientific pediatrics, the very corner-stone upon which the specialty has been erected? They are declaring that in practice the much-lauded milk laboratory, where the babies' food is prepared according to the prescribed formula and in the most aseptic manner, is, after all, not of great moment to the well-being of the baby. Now, although it may be true that the influence of the milk laboratory has been somewhat exaggerated and although the expression "scientific infant feeding" has been loosely used—for infant feeding is not a science, but merely an art—we believe that the proper and intelligent preparation of milk in the asylum is of great advantage as compared with the unintelligent and careless methods carried out in the tenements.

The fact of the matter probably is that just as you may have good and poor institutional care, so there is good as well as poor care of infants who are boarded out, and there is nothing sacred in either system. In this point of view I differ absolutely from Chapin, who, as regards institutions, believes that "the high mortality is not so much due to lapses in care or details in management as to the system itself, which is wrong." Some of our experiences hardly lead to this conclusion. The accompanying table (Table 5) shows a number of infants who were admitted

TABLE 5. DATA OF A GROUP OF INFANTS COMMITTED TO THE ASYLUM FROM BOARDING-OUT HOMES.

	No. of Months Boarded out.	Age in mos. on admission.	Weight (lbs.) on admission.	Average wght. for this age.	Weight 4 mos later.
1.	6	8	13	17	19.5
2.	10	11	14	19	22
3.	10	11	12	19	20.5
4.	1	5	9	14.5	16.5
5.	8	9	11	17.5	18
6.	9	10	12	18	19
7.	10	11	16	19	20.5
8.	10	12	22*	20	25.5
9.	9	11	14	19	Died.

* Nursed.

to the asylum last spring after having been boarded out for many months in licensed homes in New York City. It will be seen that they were a poorly-nourished group, markedly under weight, with the exception of one (Number 8) who had been boarded out with a wet nurse. All but one of these babies had been boarded out for a half year or more; nevertheless their health could not be compared to that of institutional children as we are wont to see them. They gained at once in the asylum, and it will be seen that four months later they had increased remarkably in weight. I may add that they have continued to do well.

My purpose is not to insist upon the acceptance of the institutional care of infants as the ideal system, but, by demonstrating its successful operation, to warn against the extreme denunciation which is current to-day. Just because some of our infant asylums have been poorly administered, municipal authorities and many physicians have sweepingly condemned them as a whole and urged the adoption of the boarding-out system without a thorough investigation and comparative study of the possible merits and abuses of each. Let us just gather abundant and accurate statistics before we definitely commit ourselves against either.

Infants, and by infants we refer to babies under the age of two years, can be reared with success in institutions. The mystic "hospitalism" is not a pervading evil genius which necessarily inhabits infant asylums; it is something concrete, and can be eradicated just as surely as was surgical "hospitalism," which was considered inevitable in the pre-Listerian days. Hospitalism simply means lack of proper accommodations, nursing which is inadequate in quality or quantity, insufficient or inefficient medical attention, and, most of all, frequent and multiple infection which necessarily results from such defects. It is not the infants, but, on the contrary, the children over two years of age, who do not thrive in institutions and suffer from this environment. They need the home, they need the fondling, they are stunted mentally by being herded together and never knowing the mother's care. Children of this age should not be brought up in the wards, where their individuality is trampled upon and blighted. They do better when boarded out because they are of an age to respond to the benefits of family life, and are beyond the age when questions of diet and of minor infections play the important rôle which they do during infancy.

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ONE THOUSAND THREE HUNDRED AND THIRTY-FIVE CASES OF SCARLET FEVER TREATED WITH MOSER'S SERUM—L. Axenow (Jahrb. f. Kinderheil., February 8, 1915) gives the conclusions arrived at after the treatment of 1,335 cases of scarlet fever with Moser's serum. The cases were treated at the Kinderspital of Petrograd. The serum is monovalent. Of those treated, 364 died, that is, 27.3 per cent. The serum was given only to severe cases. There were four factors in the mortality among these children—the age of the patients, the day of illness on which the injection was made, the amount of serum used, and the quantity of the applied series. The older the children the lower the mortality. The earlier in the disease the injection was made the better were the effects. The serum should be given in a single large dose to get the best effect. Small repeated doses do not give good results. Doses of 50 c.c. should be given only during the first two days of the sickness; of 100 c.c. in the third and later days of the sickness. A mixture of different series of serum has not a good effect. Not less than 150 c.c. should be given, and all of the serum of the same horse. No child under one year should be injected. The positive good effects of the serum are demonstrated by a lowering of temperature, pulse, and respiration, and an improvement of the general condition. A child who is apathetic and weak may be transformed into a laughing, playful child within twenty-four hours after the injection. The period of eruption is shortened. The serum has no direct effect on the complications of the disease. Nephritis alone is benefited by the serum, and is seldom seen in injected cases. There are undesirable serum effects in some cases—*The American Journal of Obstetrics.*

MITRAL STENOSIS IN YOUNG CHILDREN

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The two following cases of mitral stenosis in young children are reported because they bring up for discussion a number of interesting questions relative to the etiology of this cardiac condition. It may be well first to describe the history and physical findings in each case:

Case I. Jacob W., ten years old, born in New York of Russian parents.

Family History—Parents healthy. No history of tuberculosis, cardiac disease or rheumatism. Seven children living in good health. Three children died before reaching the age of one year, all with symptoms of convulsions. One miscarriage, self-induced.

Personal History—Born at full term, non-instrumental delivery. At three years had a mild attack of measles without complications. No history of any other illness whatever. When six years old it was noted that the child was very small in size and was not apparently growing taller. A physician was therefore consulted and in a routine examination a heart lesion was discovered. There had been no acute illness to date. No history of cough, dyspnea, cyanosis or edema.

Physical Examination—General condition and color good. Small, hairy nevus on right side of abdomen. Teeth carious and slightly notched. Tonsils large. Head, eyes and ears negative. Chest shows evidence of previous rickets—marked pigeon breast. Lungs: Hyperresonant back and front. Auscultation negative. Heart: Apex beat palpable and visible in the fifth space in the nipple line, 3 inches from the middle line. Very marked rough presystolic thrill felt over the apex. Pulmonary emphysema makes outlining of the heart borders impossible. Heart action rapid and regular. At the apex there is heard an extremely loud, rough, rumbling murmur, presystolic in time, which is followed by a sharp, snapping first sound. This murmur is so loud that it can be heard all over the precordium. No other murmur. Second sound at the pulmonic area distinctly accentuated. Pulses regular, rapid, very small. Liver and spleen not palpable. Knee-jerks lively. No clubbing or cyanosis of extremities. Measurements: Circumference of head, 20 inches; chest, 24½ inches; height, 46½ inches. Blood and urine examinations normal. Wassermann reaction and von Pirquet test negative.

CASE II. Louis M., aged seven and one-half years, of Italian and Russian parentage, was first seen by me at Mount Sinai Dispensary in May, 1913, when he was six years old.

Family History—Negative. Mother has had no miscarriages. Three other children living and well.

Personal History—Born at full term. Normal delivery. At eight months had a convulsion. Breast-fed for two years. When three years old it was noted that the child got out of breath very easily and that, as the mother expressed it, "he puffed like an asthmatic." At this time the lymph nodes in the neck began to enlarge. The child was sent to a hospital, where he was treated as a case of cervical adenitis due to tuberculosis. He remained in the hospital three weeks and one of the nodes was incised and drained. One year later the adenoids were removed. All this time it was noted that the boy was markedly under-developed and puny, though this was attributed to the cervical adenitis. The mother was told nothing concerning the heart. At the age of four and one-half years the boy had a mild attack of scarlet fever. At the age of six he was brought to the clinic on account of the fact that he appeared feverish for several days and because the cervical nodes had begun to swell again.

Physical Examination—Small, puny, frail child. Skin of a grayish-yellow tint. Eyes very prominent, distinctly exophthalmic. No Graefe or Moebius signs. In the submaxillary and anterior cervical regions the lymph nodes are felt as smooth swellings, varying in size up to that of a hickory nut; not tender; not fluctuating. Other superficial nodes are enlarged and hard, including epitrochlears. Teeth carious. Mouth, throat and ears negative. Chest shows no evidence of rickets. Lungs negative. Heart: Apex beat seen and felt in the fifth space in the nipple line. Percussion shows the right border at the right sternal border; left border at the nipple line; upper border at the third rib. At the apex there is felt a very pronounced rough presystolic thrill. There is a rough presystolic murmur to be heard in the region of the apex. The heart action is rapid and regular. Liver is felt three fingers below the free border of the ribs. Spleen not felt. Abdomen otherwise negative. No evidence of ascites. Extremities negative; no clubbing or cyanosis. Height of child, 42 inches. Weight, 34½ pounds. Urine examination shows a faint trace of albumin. Blood examination: Hemoglobin, 65 per cent.; red cells, 3,920,000; white cells, 6,200. Differential count normal. Wassermann reaction four plus positive.

Subsequent Course—On obtaining the result of the Wassermann test, antisyphilitic treatment was begun at once. The child's general condition improved and his appetite, which had been very poor, improved. The submaxillary and cervical lymph nodes diminished in size and the temperature remained normal. During the next year and a half the child's condition has remained about the same. His only complaints referable to his heart are occasional attacks of dyspnea and cough. The liver has diminished in size. The boy has grown about 2 inches in height, but his weight has increased only to 35½ pounds, a gain of 1 pound. Mentally the child is distinctly below normal, making the impression of about five years of age.

The two main points of interest in these cases are, first, the question of the etiology of the cardiac condition, and, second, the relation between the cardiac lesion and the growth of the child.

The history of Case I. fails to mention any illness which might be looked upon as an etiologic source for the damaged heart valves. The child has never had any manifestation of rheumatism, such as angina, chorea or arthritis. There is no history of any infectious disease excepting measles, which apparently ran a normal course. The cardiac lesion was first noted by a physician when the child was six years of age, and previous to that time there appears to have been absolutely no cause for cardiac involvement. Moreover, the boy has never had the slightest symptoms referable to his heart; no dyspnea, no palpitation, no cyanosis, no cough, the lesion having been discovered accidentally when the child was examined on account of his stunted growth.

The entire absence of symptoms and the early age at which the lesion was discovered might lead one to include this case among the so-called "congenital" cases of mitral stenosis; for that stenosis of the mitral valve may occur as a congenital condition, though disputed for a time, is now generally admitted. On this question F. J. Poynton[1] says: "A congenital mitral stenosis cannot be denied, but I feel sure it is an exceedingly rare event, for in ten years' experience I can recall 1, or possibly 2 cases, which I date with any confidence from birth." In the literature, moreover, there are a few autopsy reports in which the condition is described in infants. Thus Ludwig[2] reports an instance in a baby dying a few minutes after birth; Kokel[3] reports one in a cyanotic infant forty hours old; Sansom[4] reports an infant of two months, the edge of whose mitral valve showed numerous granulations. Fisher[5] reports an autopsy on a fifteen-months old infant showing a peculiar malformation of the left ventriculo-auricular aperture leading to very narrow stenosis. Hutinel[6] says: "Even if it is rare to diagnose it (mitral stenosis) in the infant, although Sansom observed it in a boy of four, it has, nevertheless, an early anatomical existence, since there are cases where it is congenital."

In spite of these data, however, others still proceed with considerable hesitation before diagnosing as congenital a mitral stenosis without any ascertainable etiological factor, as is shown by the case recently reported by F. P. Weber.[7] This author describes an infantile girl, fifteen years of age, with a marked mitral stenosis. The history fails to give any clue as to the origin of the cardiac lesion, yet Weber states that rather than consider it congenital, he is inclined to attribute it to a rheumatic process which has been overlooked. Moreover, though as stated above there is definite evidence that a stenosis may be present at birth, most of the English and German writers incline to the view that, even in congenital cases, the crippled valve is caused not by malformation, but by an intrauterine endocarditis. The French school, however, takes the opposite view and brings forward a number of arguments in favor of the theory that the stenosis is congenital and is due to some developmental error. We shall discuss this point more fully in connection with Case II. where the question of congenital syphilis further complicates matters.

That our patient had never shown any symptoms referable to his heart is also of interest in view of the very large group of cases of mitral stenosis first differentiated by Duroziez and since then called by his name. This author[8] described in 1877 under the name of "Pure Mitral Stenosis" a group with the following characteristics: "Pure mitral stenosis, *i.e.*, without a murmur of insufficiency, without much dilatation of the auricle, without lesion in the lung, is more frequent than was believed. It is easily overlooked, the patients being troubled very little and having in no way the appearance of cardiacs. The heart is normal in size and impulse. The pulse is regular. Pallor is remarkable. The first sound is strikingly loud. The onset is often difficult to fix and may go back to infancy. Often one fails to find the history of any acute disease. It is commoner in women. It is compatible with long life."

The literature both in German[9] and in French now contains numerous reports, articles and treatises on this so-called "Duroziez' Disease"; but Duroziez' original paper says very little about the congenital nature of the disease, the author only surmising that, on account of the absence of any etiological factor, the condition must go back to birth. However, other authors in dealing with this particular type of cardiac disease speak of it as Congenital Mitral Stenosis. In other words, there is a confusion in the literature between cases really proven to have been affected at birth and those in whom in early adult life (from fifteen to thirty years) the signs of mitral stenosis are discovered without having given rise to the symptoms common to patients with heart lesions. Thus the followers of Duroziez believe that there is a developmental error present in the hearts of patients affected with Duroziez' symptom complex, even though there be no physical signs or symptoms of stenosis till after puberty. The reason which is stated by most authors to account for this lack of cardiac symptoms is that until puberty the heart is well able to take care of the circulation, but that the sudden growth of the body outstrips the powers of the heart, handicapped as it is by its developmental deformity, and that as a result of its inability to maintain the circulation, the signs and symptoms of mitral stenosis become apparent.

Our case, however, had not undergone any special cardiac strain and had no occasion to have had the symptoms brought out by sudden bodily growth, and therefore with the frank signs of mitral stenosis present so early in life, this case cannot well be grouped as a case of Duroziez' disease.

Is this case one of true congenital stenosis? I think that this should be answered in the negative for the following reasons: The number of cases of congenital stenosis proven by autopsy is exceedingly small, only about six in all; and these are all in infants. If any cases of stenosis survived one should expect to find an occasional reference to a child in its second, third or fourth year with signs of mitral stenosis. This is, however, not the case, for I have been able to find but one case under five and a half years of age. Granted, then, that our patient's heart is not congenitally malformed, there are two possible factors which may cause the lesions—either the child has had rheumatic attacks which have been overlooked, or else there is present some condition, possibly congenital in origin, which hampers the growth of the heart in such a way that stenosis results. The very clear history given by the parents that the child had never had any febrile illness would seem to exclude the rheumatic factor and leaves the last mentioned factor to be considered.

That a chronic illness such as tuberculosis or syphilis may affect the development of the body needs no proof, and it is now claimed that the occurrence of mitral stenosis in young individuals who are also subjects of congenital lues is no mere coincidence. A large number of cases of syphilitic mitral stenosis have been reported by French authors[10] following Jacquet[11] who called attention to the condition in 1891. Many pediatrists on the other hand, appears to agree with Still, whose views are as follows: "Congenital heart disease has been attributed by some observers to congenital syphilis, but in my own experience, the association has been present so rarely that I cannot but think that it may have been merely a coincidence. It is quite likely that syphilis may, as I have already suggested, like any other condition which interferes with the health of the mother, interfere with her powers of perfect reproduction, and so favor the occurrence of congenital anomalies in her offspring. In this manner it may be one of many causes of congenital heart disease, but even so I think the relation is rare; congenital heart disease occurs far more often where there is no family history of syphilis."[12]

Fournier,[13] on the contrary, is quite definite when he says: "The rôle of specific heredity is no longer contestable nor contested to-day, as regards cardiac malformations, so greatly have the observations on this subject increased in number. . . . What has been termed 'pure mitral stenosis' is not a stenosis resulting from a pathological process, as for example, a fetal endocarditis, as was originally supposed; it is, on the contrary, a primary independent lesion, a congenital malformation, proceeding from an arrest in development." Huchard[14] also leaves no doubt in the reader's mind when he says: "Pure mitral stenosis is neither the result of a fetal endocarditis nor of an infantile endocarditis nor of a marginal valvulitis of tubercular origin. Hereditary tuberculosis, and especially hereditary syphilis, as well as all causes of degeneracy, may produce congenital mitral stenosis by cardiac malformation which is the result of an arrest of development, that is to say the persistence of the union of the valvular apparatus."

More recently the work of Brooks[15] and especially of Warthin[16] contributes to the importance of syphilis in the etiology of heart disease, the latter author concluding as follows: " . . . but my own experience would make me believe that syphilis, both congenital and acquired, is the most important etiological factor in the production of cardiac disease, both myocardial and endocardial."

Our second case then, with its positive Wassermann reaction and its stigmata of hereditary disease, would undoubtedly be classified by the French as belonging to the syphilitic group. However, one may not lose sight of the fact that the cardiac condition might be due to some infection overlooked or forgotten and that the presence of syphilis had nothing to do with its etiology. In this connection it may be of interest to mention a case observed during the past summer: A boy of seven presented an enlarged, nodular liver; slight jaundice and a mitral stenosis. As the Wassermann reaction was four plus positive, it was tempting to diagnose not only the hepatic, but also the cardiac lesion as due to syphilis. On closer questioning, however, a distinct history of a previous attack of acute articular rheumatism and chorea was obtained.

It seems best therefore not to be too positive in ascribing the mitral stenosis to congenital syphilis in our second case, in spite of the many cases reported in the French literature. Since observing these cases, I have had Wassermann reactions made in all cases of endocarditis coming under my observation, but have had no other positive reaction, excepting in one case with adherent pericardium. It is also worthy of note that Cabot[17] in his series of 316 cases of mitral stenosis makes no mention of syphilis as an etiological factor.

In both of our cases we find that the size of the child is much below normal, and while in our second case this may be ascribed to the syphilitic infection, in our first case we have no apparent cause for the stunted growth, except the cardiac condition. The relation existing between the growth of the body and the condition of the circulatory system is a more or less close one. The retarded development of certain children suffering from heart disease has been frequently noted and has led to the coining of the term Cardiac Dwarfism or Cardiac Infantilism. This lack of development, especially as evidenced by small stature, is well shown in both of our cases and may be explained in one of the following ways:

1. The small stature is the result of the cardiac lesion, *i.e.*, the heart is unable to supply the body with sufficient nutrient fluid and bodily growth is thereby hampered.

2. The trophic disturbance is primary and the cardiac lesion secondary. This is the explanation put forth by certain members of the French school who see especially in hereditary tuberculosis a cause for poor general development, whereas tuberculotoxine later affects the heart valves and causes cardiac deformity.

3. The cardiac disturbance and the heart lesion are contemporaneous and due to the same cause. This would explain the cases with congenital syphilis.

4. Finally, Weber has emphasized the fact that in the small size of the body of these patients we should see a "conservative adaptation or conservative hypoplasia of the whole body—nature's attempt to limit the growth of the patient in accordance with the limited blood supply."

In summing up we may say that the consideration of these two cases leads us to emphasize the following points:

(1) In cases of mitral stenosis in children, especially where there are no physical signs of insufficiency present, though we have no definite proof of their luetic origin, syphilis should be thought of and a Wassermann test done.

(2) Cardiac disease, especially valvular stenosis, exerts a considerable influence on the growth of the individual.

(3) A careful study of the literature on the congenital nature of mitral stenosis leads to the following conclusions:

(*a*) Mitral stenosis has been observed at autopsy in infants.

(*b*) Mitral stenosis has been observed in children over five years old in whom there was no apparent etiological factor present. Such cases have been termed "congenital," though without sufficient evidence of their being so.

(*c*) No case of mitral stenosis has been found reported in children between the ages of infancy and five years.

(*d*) The clinical picture described by Duroziez as Pure Mitral Stenosis should not be confused with the congenital lesion occurring as a great rarity in infants.

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AN EPIDEMIC OF DIPHTHERIA—In reviewing a group of 100 cases of diphtheria last winter, Guiart and Fortineau (Presse Méd., Paris, June 3, 1915, No. 25, pp. 189-196) noticed that the long diphtheria bacilli were invariably associated with the more virulent type of the disease. When the short bacillus was found in the throats of carriers, no infection resulted. The long bacillus generally disappears from the throat in five weeks, the short in three. About 125 carriers were found among 640 inmates of the hospital, but only one carrier developed diphtheria, even when they were in contact with diphtheria patients.—*Journal of American Medical Association.*

INTESTINAL PARASITES IN CHILDREN *

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Despite the emphasis which for many years has been laid upon laboratory methods in diagnosis, and the extent to which examinations are made of blood, urine and feces in hospital practice at least, our knowledge of the number and variety of intestinal parasites in children is very imperfect. The information contained in standard texts is often such as to support the view that these organisms are of little importance. This situation is fairly well pictured by a quotation from a much used work on children's diseases:

"The worms which are found in the intestines of infants and children are the same as those which occur in older patients. The only ones which are common and important enough to speak of are the Oxyuris vermicularis or pin worm, Ascaris lumbricoides or round worm, Taenia solium (pork tapeworm), and Taenia mediocanellata (tapeworms)."

Now, as a matter of fact, there are only three errors in this statement concerning the parasites of children: (1) They are not characteristically "the same as those which occur in older patients." (2) Those mentioned are not "the only ones which are common and important enough to mention." (3) Two of the four are neither common nor relatively important.

The questions to be considered and answered as far as possible are: (1) What forms do occur in the United States of America? (2) How frequent are they? (3) What is their relative significance? (4) How does infection occur?

In 1906 Stiles and Garrison examined feces from 123 children under fifteen years of age and found infection with intestinal worms in 21.14 per cent. Trichuris was present in 13 per cent., Oxyuris in 1.63 per cent., Ascaris lumbricoides in 0.81 per cent., and Hymenolepis nana in 4.88 per cent.

In 1910 Schloss published a careful study of 310 children between two and twelve years of age. Thirty of these were selected cases, but in a second group 280 were taken consecutively and included all of the given ages in the families treated. Of this group 28.57 per cent. were infected. Trichuris occurred in 11 per cent., Oxyuris in 8.2 per cent., Hymenolepis in 7.1 per cent., Ascaris in 2.1 per cent., and Taenia saginata in 1.8 per cent. of the cases.

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* Read before Central States Pediatric Society, Chicago, October 16, 1915.

Within the past year, in a Southern city, in an examination that included 1,287 school children, from six to eighteen years of age, 36.73 per cent. of the white children and 49.12 per cent. of the negro children were found by Stiles to be infected with intestinal parasites. The infection with Endamoeba was 8.76 per cent. of white and 11.93 per cent in colored children. For Lamblia the figures were 12.75 and 6.46 per cent.; for Trichomonas, 0.64 per cent.; for Ascaris, 7.47 and 27.98 per cent.; for Oxyuris, 0.39 per cent.; for Trichuris, 1.28 and 11.54 per cent.; for Hymenolepis, 0.26 and 0.19 per cent., and for Necator, 10.69 and 3.33 per cent. respectively.

These records are drawn together for easy comparison in the following table. Separate numbers indicate percentage of infections; others show ratio in cases under examination:

	Stiles and Garrison	Schloss	Stiles in X	
			white	colored
Trichuris	13 =1:8	11 =1:9	1.28=	11.54=
Ascaris lumbricoides	0.8 =1:125	2.1 =1:48	7.5 =1:13	28 =1:4
Oxyuris vermicularis	....	8.2 =1:12	0.39=	3.3 =1:30
Necator	....	....	10.7 =	0.19=1:500
Hymenolepis nana	5 =1:20	7.1 =1:14	0.26=1:400	....
Taenia saginata	....	1.8 =1:55	....	....
Endamoeba	....	....	8.8 =	11.9 =
Lamblia	....	....	12.75=	6.5 =
Trichomonas	....	....	0.64=	....
Infected	21.1 =1:5	28.57=2:7	36.73=2:5	49.12=1:2

These figures seem high, in fact are higher, than would have been expected on the basis of European records. However, Oxyuris constitutes a marked exception to this statement, as it occurs in 30 per cent. of all European examinations (Kiel, Helsingfors, Munich), where it is thus eighty times as common as in this series of examinations. Part of the excess which the table shows may be due to some local condition favoring infection or spread of parasitic forms; another part is certainly due to the thorough character of the investigations in this country. They certainly indicate that intestinal parasites are more common than has been supposed, and hence constitute a danger even greater than has been recognized. These records are not extensive enough to form a basis in some instances for safe generalizations, but where the numbers are large they show interesting relations to such things as geographic locations; for example, the hookworm ratio of 1:10, even in the city in the South, and not once found in 500 cases from Northern cities; to racial susceptibility, as in the three times greater frequence of hookworm in white children than in negroes; to manner of life, hygienic surroundings, etc.

Probably the most important fact for the present discussion is that no group shows a frequence of less than one case infected in every five. Note further that the earlier records took no notice of intestinal protozoa, and if the lowest probable estimate be placed upon these then the earlier records become two infected children in five examinations, or more; this agrees substantially with the record of the most favored group in the last examination quoted. Finally, let me direct especial attention to the fact that of the two tapeworms regarded generally as standard human parasites, one does not occur at all and the other only in one locality with a frequence of 1.8 per cent. Of the two round worms mentioned in the quotation, Oxyuris does not appear in two out of four groups and in only 0.4 per cent., or in 1:250 cases, in one other; in New York City among the class investigated it occurred once in 12 cases. The other round worm Ascaris appears in all four groups with a frequence of 0.8, 2.1, 7.5 and 28 per cent. or 1:125, 1:48, 1:13 and 1:4.

There are nine types of intestinal parasites recorded from children in these investigations and those omitted from the list cited are more widely distributed and more general in their occurrence as well as more frequent than those named. This analysis of the evidence presented shows clearly that two general conclusions concerning parasites in children are safe: (1) They are more frequent than commonly stated; (2) there are more varieties than usually listed.

Among the Trematodes or flukes there are none in this country which constitute a menace to the child. In fact, not a single species has yet been reported in a way to show clearly that it is endemic in the human host here; and the species which have been introduced from other countries in the various cases on record are known only from the adult and do not appear likely to be of especial significance to the immature. This would not hold good of the blood-fluke so common in Africa and Asia, and so sinister in its attacks on man. Fortunately its establishment on this continent appears unlikely for biologic reasons.

Among the Cestodes or tapeworms there are three species conspicuous for their size and long known by virtue of this and their abundance in certain regions. These are the pork tapeworm, Tenia solium, the beef tapeworm, Tenia saginata, and the fish tapeworm, Dibothriocephalus latus. As a matter of fact, all of these have been reported from hosts of all ages, even from suckling infants. But such cases are great rarities among many thousands of records. No one of them is as likely to be parasitic in a child as in an adult and both the fish tapeworm and the pork tapeworm are so rare on this continent that the discovery of a case ranks among the most unexpected of occurrences. They are accordingly not forms which demand the especial attention of the pediatrist and if ever present are so easily recognized that the case will present no especial difficulty in diagnosis. But this cannot be said of certain other cestodes.

Of the approximate thirty varieties of cestodes recorded from the human host, four are said to occur chiefly in children. These are all small forms and the knowledge of their occurrence is of recent acquisition. They are all forms to which the attention of students of children's diseases should be carefully directed, even though one of them has not been recorded outside of the sub-tropical zone. Their insignificant size renders them easily overlooked and present information is certainly inadequate to show their true range or frequence. In fact one of them, not even mentioned in many standard works, is in the opinion of investigators the most abundant North American tapeworm. These four important forms are the following:

Davainea madagascariensis has been reported only from tropical regions and the total number of cases on record is small. Of nine cases, two only are in adults. The normal host is probably not man and the intermediate host has been conjectured to be Periplaneta orientalis, the Eastern cockroach. The introduction of this parasite into the human intestine is due to gross carelessness or indifferent hygienic surroundings.

Dipylidium caninum is a normal parasite of dog and cat and is extremely abundant in those hosts. About 100 cases in man are on record. Most of these concern children, even of very immature age. Thirty-four per cent. of cases are in sucklings of five weeks to six months; 42 per cent. in infants of seven months to three years; 10 per cent. in children of four to eight years, and only 13.5 per cent. in those over eight years of age. The bladderworm stage of this species is passed in the flea and the dog or cat infects itself by swallowing infected fleas. Children of tender years are infected by chance through too intimate contact with pet animals. Such contact is most frequent in the earliest years of a child's life, and small dogs chosen as pets for children are the types most generally subject to this parasite.

Two species of Hyemenolepis have been recognized in recent years as frequent parasites of man. These are Hymenolepis nana and Hymenolepis diminuta. The second is a common parasite of the rat, and the first, in the opinion of Grassi, is also. Unfortunately in neither species has the life-history been worked out and we are forced to base our conception of the source of infection in man on conjecture. One species is said to be transmitted directly to man through the ingestion by accident of the eggs or proglottids from another host. The other species is believed to pass through an intermediate host, some insect in which the bladderworm stage develops. The contamination of food or drinking water would suffice to carry that insect with the bladderworm into the human intestine. In either case, infection is due to that disregard of hygienic conditions which characterizes young children and those of defective mentality; and these are in fact the classes most largely infected by these parasites.

The Nematodes or roundworms furnish more parasites to the human species and consequently more to children than either of the groups mentioned before. Of Ascaris lumbricoides, the stomach worm, Oxyuris vermicularis, the pinworm, and Trichuris trichiura, the whipworm, so much has been said elsewhere that the mere mention is enough for the purposes of this discussion. They are important, they are generally easily recognized, and the treatment of such cases is well understood.

I may also pass unnoticed a number of rare species and of forms that have not yet been reported in our territory, except as imported in some immigrant from the infected area or traveller returning from it. Such species may become significant later, but are outside the limits of this discussion. There are left several species of Nematodes which call for especial consideration here.

No extended reference is needed to justify the mention of hookworm disease in this discussion. Its wide prevalence and serious effects are sufficiently known and probably everyone is familiar with the fact that it is conspicuously a disease of the young. In one record of 1,470 cases, 58.5 per cent. are listed as under sixteen years of age and only 18.5 per cent. over twenty. Most of you are familiar with pictures showing the way in which the presence of this parasite reduces the vitality of the child and you doubtless are also aware that the effect on the growing organism may be produced by a small number of parasites. On the other hand, it is self-evident on a study of the life-history of the hookworm and the method of infection that children are much more likely to become infected than are adults in all save a few special occupations. This again is a parasitic disease to which the child is more liable than the adult and from which the effects are also more serious in the immature host.

It is important to emphasize further that this is a disease primarily of early life, although the statistics are inadequate to show clearly just how early in life it is acquired. The figures given by the Porto Rico Commission show that in a total of 278,000 cases treated up to 1911 over 11 per cent. were under ten years of age, and about 20 per cent. between ten and fourteen years, which is the five-year period embracing the greatest number of cases. Less extensive statistics from our Southern states show much the same relative frequence of cases in different age groups. One must bear in mind that the cases examined at ages in the ten to fourteen-year group were apparently infected first at five years or earlier. The data are not such as to furnish clear evidence on the exact age the infection is acquired.

Within very recent years, evidence has been secured to show that organisms almost unknown to pathology before, viz., the Protozoa, play an important rôle as parasites of the human intestine. These organisms are minute and delicate, hence difficult to obtain and to study. Special methods for their observation and culture are only just being worked out. One notes marked differences of opinion, even among investigators, as to the number of species of such organisms and as to their pathologic significance. But every year adds to the certainty of the conclusion that they are frequent and of serious import in human pathology. This is unquestionably one of the most fertile fields for research at the present time.

These organisms are both amoeboid and flagellate. No doubt there are many species and varieties. For the purposes of this discussion they may be treated as a group and some facts elucidated by recent studies be taken as representative of their special significance to students of children's diseases.

Stiles has called attention to the fact that the presence of certain protozoa, viz., Entamoeba coli, Lamblia, and Trichomonas, in the human intestine demonstrate that the host has ingested contaminated material. These organisms leave the body only in feces (or urine) and enter it only in spore form through the mouth. They have no free motile stage. For the adult, the presence of such parasites is evidently due in the large majority of cases to the ingestion of food or drink which has been contaminated by fecal material; and usually drinking water or uncooked vegetables are held responsible, as they can most easily act as mechanical carriers and are readily contaminated by sewage. But Stiles is convinced that in the region where he has been working the fly is a more frequent agent in the transmission. Breeding as these insects do in large numbers in surface privies of rural communities or of towns where such privies are permitted, the flies move directly from the source of contamination to the kitchens of the neighborhood and deposit the dirt and spores on food, dishes and other articles from which the transfer to the human mouth is immediate and natural. When 293 flies were caught in one flytrap in a surface privy and 1,742 flies in another flytrap in a kitchen only forty feet away, and when flies were seen passing to and fro between these places, carrying and depositing particles of lime, etc., the actual transfer of spores could hardly be doubted. Though extremely difficult to detect because of their minute size, the cysts being only seven to fifteen microns in length, some of the spores were actually detected in sterilized water used to wash flies that had visited contaminated material. In this particular community, the drinking water is sand filtered and can hardly contribute to the infection, which averages 23 per cent. in the 187 cases examined. The infection was 30 per cent. in those houses with a surface privy and dropped to 20 per cent. in houses having a sewage connection and no privy. Age statistics are not given, but the author notes that these Protozoa are exceedingly common in children, and an infection of 50 to 100 per cent. was not unusual in these families.

It may well be that some of the children acquired the parasites through the use of soiled hands, or by sucking toys, sticks, fruits, and other articles on which the spores had been deposited by flies. The disregard of hygienic precautions manifested by children generally no doubt does have its influence here and a census of adults would likely yield a lower percentage of infection than that cited above. But, however, directly or indirectly acquired, the parasites are there, and command our attention here as dangers threatening the child.

Occasional clinical records emphasize this conclusion. Thus, for instance, epidemics of Lamblia in orphans' homes and other institutions for children furnish further evidence of the part the Protozoa play in children's diseases. In this as in other cases it is clear that the increase noted is due not to new diseases, but to more perfect knowledge accompanying newer methods of investigation.

The data just presented emphasize the importance of frequent fecal examinations. The presence of the smaller intestinal worms will often be unsuspected until the microscope shows up their characteristic ova. The Protozoa are demonstrable only by microscopic examinations. Even a little experience is adequate to distinguish the various types and thereafter a diagnosis is rapid and accurate. I should not leave this topic without a brief mention, at least of the pitfalls in the path of the diagnostician in the form of foreign materials usually of plant origin that are too easily diagnosed as worms. The most common in the feces of the child are pulp vesicles from the orange that simulate closely some sort of a fluke and the partly digested fiber of the banana, that are strikingly like a mass of small tapeworms. The latter have been discovered and described in this country at regular intervals since 1883, when Dr. William Osler first suggested their true nature.

DIPHTHERIA CARRIERS—G. Van't Hoff (Monatschr. f. Kinderheil., Bd. XIII., Nr. 3, 1914) tabulates the results obtained from cultures made from forty-one diphtheria patients who had been dismissed as cured from the Berlin Charity Hospital. Instead of cotton swabs he used platinum loops to stroke the tonsils and press the bacilli out of the crypts. The cultures were incubated from twenty-four to forty-eight hours. The author found virulent bacilli present from five to ten months after leaving the hospital with a clinical cure. Bacilli did not disappear in from three to six weeks after cure, as has been supposed would occur; but continued for a much longer period. The cultures were made in the homes of the discharged children, who were followed for many months after their discharge from the hospital.—*The American Journal of Obstetrics.*

SOCIETY REPORTS

THE NEW YORK ACADEMY OF MEDICINE—SECTION ON PEDIATRICS

Stated Meeting, Held December 2, 1915

Walter B. James, M.D., President of the Academy,
in the Chair

A DISCUSSION OF ACIDOSIS WITH SPECIAL REFERENCE TO THAT OCCURRING IN THE DISEASES OF CHILDHOOD

Dr. John Howland, Professor of Pediatrics of Johns Hopkins University, Baltimore, and Dr. W. McKim Marriott, Assistant Professor of Pediatrics, presented this paper, in which it was stated that the term acidosis was at the present time very loosely employed in clinical medicine, being used for the most part to indicate that acetone bodies had been found in the urine by qualitative tests. It is assumed that the acetone bodies are very abnormal and that their presence signifies an unusual complication in the course of disease; whereas, in many instances, we may liken the mere presence of acetonuria to fever, for it occurs in most of the infectious diseases of childhood with much the regularity that fever does. Hyperexia may, however, develop and in itself be dangerous or fatal; so, too, a production of the acetone bodies may in itself determine a fatal outcome. But the quantitative difference between the mere presence of the acetone bodies and their production in amount sufficient to threaten life is an enormous one. Acids are always being formed in the body and means are always being taken to neutralize and get rid of them. Moreover, it is not the mere presence of the acetone bodies that determines acidosis. In order to understand how acidosis may be brought about or, in other words, how the normal relationship of alkalies to acids in the body may be disturbed, it is necessary to consider the method by which the body maintains its equilibrium, in which there is a preponderance of bases over acids. With extraordinary regularity the blood is maintained at a constant reaction which is slightly alkaline. The body is constantly elaborating acids as the result of oxidative processes in intermediary metabolism. In addition certain organic salts are formed in small amounts and usually transformed completely into carbon dioxide and water, though a small quantity of such substances as lactic and uric acids leave the body unchanged. Also acid radicles predominate in the mineral constituents of many of the common foods. To guard against the deleterious influence of acids formed or introduced into the body, a most efficient mechanism is available. It is only necessary to consider the mechanism from the standpoint of the blood, for this serves to regulate the reaction for the entire body. The important constituents of the blood influencing this regulation of the reaction are sodium bicarbonate, occurring chiefly in the plasma; the acid and alkaline phosphates of potassium, found almost entirely within the red blood cells, and the proteins. Acids, whether formed in the body or introduced from outside, displace the carbonic acid from the sodium bicarbonate and set carbon dioxide free. This excess of carbon dioxide is removed by the increased pulmonary ventilation, leaving a neutral salt, sodium oxybutrate, or chloride, or what not, to be removed by the kidneys. Such a mechanism allows relatively huge amounts of abnormal acids to be at once rendered innocuous and removed. Thus, dyspnea or, more properly, hyperpnea, under abnormal circumstances, is an agent of the greatest value in ridding the body of carbon dioxide and keeping the reaction within normal limits. Hyperpnea is the best of all the evidences of acidosis to be obtained by physical examination alone. If the bicarbonates of the plasma were the only method of defence of the body the organism would succumb to acidosis as soon as the carbon dioxide was depleted by the excretion of neutral salts through the kidneys. The second mechanism here comes into play and is that by which the acids may be removed, leaving behind parts of the base with which they have been combined, this base being available for further neutralization. The elimination is by way of the kidneys. These have the capacity to excrete an acid urine from a nearly neutral blood. They remove acid phosphate and save the base, with each molecule of acid phosphate that they excrete. The small amount of alkali thus lost can readily be replaced under normal circumstances by the alkali of the food. A third method of defence is afforded by the proteins. It depends upon their amphoteric character. These three means of defence act synchronously and reside in the blood itself.

The body possesses a further means of defense in that it is able to neutralize acid by the production of alkali in the form of ammonia. When acids are introduced or formed in the body in unusual amount, a response occurs in an increased production of ammonia. This is formed at the expense of urea, and hence represents a clear gain of alkali. From a consideration of these facts it is plain that there may be all degrees of acid production and retention, as a result of which it is difficult to set a limit and say when acidosis is present. The mere presence of abnormal acids does not indicate that there is acidosis, for they may be entirely compensated for by the various means that have been referred to. In excessive amount, however, they may be productive of great harm. Furthermore, severe and fatal acidosis may occur when no abnormal acids can be found. The means by which acidosis is recognized are, first, examination of the urine or the blood for the presence of abnormal acids, and, secondly, by seeking for evidence of unusual activity of the body's defenses, by determining the amount of ammonia excreted in the urine and its relation to the total nitrogen excretion. A high ammonia coefficient always arouses the suspicion of acidosis, but unless this can be confirmed in some other way it should not be taken as conclusive proof. For fatal acidosis may occur in uremia and in nutritional disorders of infants with no considerable increase in the ammonia coefficient. We determine the evidences of increased pulmonary ventilation by spirometer measurements or by the determination of the carbon dioxide percentages in the alveolar air. There is a diminished carbon dioxide tension of the blood in acidosis, because there is less bicarbonate in the blood. Some of it has been taken to neutralize acids and what is left is incapable of maintaining the normal reaction of the plasma, when carbon dioxide from the tissues is poured into it in the usual amounts. There is a shifting of the reaction of the blood towards the acid side and thus the respiratory center is stimulated, and the increased pulmonary ventilation serves to rapidly remove the carbon dioxide and the carbon dioxide level in the blood is lowered. The blood reaction tends to return to normal, but as the carbon dioxide is constantly formed, the dyspnea becomes constant unless the sodium bicarbonate content of the blood plasma is renewed. The quantity of carbon dioxide excreted by the lungs is not appreciably changed, but it is diluted as the result of the increased amount of air entering and leaving the lungs. For this reason the carbon dioxide percentage or tension of the alveolar air is lower than normal. Bicarbonate deficiency in the plasma is an indication of acidosis and may be recognized in a variety of ways. One of the oldest is the determination of the carbon dioxide given off by the plasma when acid is added to it. This method has recently been made applicable to clinical medicine by Van Slyke. A diminution in the volume of carbon dioxide given off indicates the depletion of the bicarbonate content of the blood. The test introduced by Sellards also indicates a deficiency in bicarbonate in the plasma. Finally, the bicarbonate depletion may be determined roughly by giving sodium bicarbonate, as recently practiced by Sellard, Henderson and Palmer. With acidosis, an increased amount of bicarbonate is necessary to bring about an altered reaction of the urine. This is usually spoken of as the tolerance for alkalies. The reserve alkali may also be determined by titration of the blood with dilute acid.

When the defenses of the body against acids break down the reaction of the blood changes. The reaction of the blood may be determined either by the electrical method or by the more recent indicator method. What is determined is the concentration of hydrogen ions. If the hydrogen ions predominate the blood is acid. In uncompensated acidosis the hydrogen ion concentration of the serum is increased. Coincident with this there is a diminution in the capacity of the hemoglobin to combine with oxygen. The methods used in the cases described were chiefly the determination of the carbon dioxide in the alveolar air, Sellard's test, the alkali tolerance, the determination of the hydrogen ion concentration of the serum and the oxygen combining power of the hemoglobin.

In childhood acidosis resulting from the production of abnormal acids is found chiefly in diabetes and recurrent vomiting. A study of diabetes in children shows very well the enormous amount of acid that may be taken care of with no disturbance of the reaction of the blood and with no effect upon the respiration.

In recurrent vomiting the conditions are more obscure and less understood than in diabetes. Alonzo Taylor, in the study of one typical case, has found that the presence of the acetone bodies might be referred to starvation, since in his case they did not appear until two or three days after the onset of the attack.

Hilliger observed the production of attacks of recurrent vomiting by limiting the carbohydrate intake, but we can hardly look upon carbohydrate restriction as the usual cause of attacks of recurrent vomiting. Neither are the acetone bodies usually slow in appearing in the urine; they are often found in large quantities a few hours after the beginning of vomiting, and cannot be accounted for on the basis of starvation.

We have studied a mild and a fatal case of recurrent vomiting. The mild case was perfectly typical and occurred in a boy five years of age, who had had repeatedly such attacks. He vomited for three days and eliminated in twenty-four hours 3 grams of beta-oxybutyric acid. His blood sugar was .071 per cent., singularly close to the figures found in Hillinger's cases with the onset of vomiting. The fatal case was seen only in the last hours of life. It occurred in a child three and one-half years old, apparently without cause and when the child was upon a rational diet. The end came at the end of forty-eight hours after his admission to the hospital in coma and with hyperpnea. Sellard's test showed a great reduction of the bicarbonate in the blood; the hydrogen ion concentration was increased and the tolerance for alkalies was increased, so that 9 grams of sodium bicarbonate was given intravenously without bringing about an alteration in the reaction of the urine. The acetone bodies in the blood were 170 mgms. per 100 grams, as much as is found in the blood of an adult in diabetic coma. Clearly the acidosis was due to the acetone bodies. Another case occurring in a boy of three years, who was sent to the hospital for a tumor of the antrum of Highmore. It was discovered that this was, in all probability, secondary to an inoperable tumor of the kidney. There was nothing unusual in his condition until it was discovered one evening that he was breathing heavily with slight effort. The next day hyperpnea was marked. There was no cyanosis. The bicarbonate in his blood, as shown by Sellard's test, was much reduced and the reaction of the blood has shifted in the direction of acidity. He was given 7 grams of bicarbonate of soda intravenously. Before 2 grams had been injected a distinct improvement in his breathing was noticed and twenty minutes after the completion of the injection he was breathing quietly and had fallen asleep. Four weeks later the boy developed another attack of dyspnea, which was promptly terminated by another infusion of bicarbonate. Dr. Howland stated that they had studied chiefly the acidosis occurring in the diarrheal diseases of infancy and had found that infants with severe diarrhea may die with no evidences of acidosis whatever. This was true of the majority. On the other hand, a number of infants with severe diarrhea do develop evidence of acidosis, and the overwhelming majority of these die. The clinical evidence of the acidosis is hyperpnea. When there has been deep, labored breathing without cyanosis we have always been able to obtain other proof of acidosis. We have found a low carbon dioxide tension in the alveolar air by the use of Plesch's method modified so that it is applicable for use with infants. The carbon dioxide tension of the air in normal infants varies between 35 and 42 m.m., while in acidosis it is less than this, frequently between 15 and 25 m.m., and with these infants the Sellard's test is positive. There is also a great tolerance for alkali, so that relatively large amounts of bicarbonate of soda must be administered in order to change the reaction of the urine. In all the severe cases the reaction of the blood by the indicator method has shown a distinct shifting of the reaction in the direction of acidity. This reaction may again become normal upon giving alkalies in sufficient quantity. Finally evidence has been obtained of an alteration in the reaction of the blood by determining a great lowering of the combining power of the hemoglobin. Having found the evidence of acidosis the question comes up as to what produces this acidosis. Uncompleted studies made in our laboratory seem to show that potential alkali is not lost in diarrheal stools. At the present time it cannot be maintained that an excess of sodium or potassium in the stools shows acidosis. In the absence of proof that abnormal acids are present or that base is lost we have sought for further explanation for the production of acidosis. There is one striking symptom of the severe acidosis of infancy, and that is a diminution of the output of urine. Complete anuria is by no means unusual. With the knowledge now available this seems to offer an explanation of the accumulation of acids, and we are at present engaged on a study of this phase of the question. From a review of the cases presented we may say that acidosis is not uncommon in infancy and childhood, and while it is especially frequent in severe diarrhea of infancy, it may appear in a variety of diseases, and sometimes apparently alone. Its recognition in older children is not difficult, the character of the respiration being usually sufficient to arrest one's attention, and one or two relatively simple laboratory tests would quickly determine the question. Older children react promptly and sometimes permanently to alkali therapy. It might be possible to stop the clinical and laboratory evidences of acidosis in infants, but they usually die. For this reason we should not wait until acidosis can be demonstrated. From the beginning we should give bicarbonate of soda to infants with severe diarrhea in sufficient quantity to render the urine alkaline and keep it so. The alkalies might be given by mouth, by rectum, subcutaneously, or intravenously. Intravenous administration was the method of choice when rapidity of action was desired, and with acidosis rapidity of action was always desirable. If facilities for intravenous injection are not at hand, the injection may be made subcutaneously. A 4 per cent. solution was employed for the intravenous and a 2 per cent. for subcutaneous use, the amount being gauged to meet individual indications. As much as 10 grams in twenty-four hours might be required.

DISCUSSION

Dr. Donald D. Van Slyke said that their experience was in complete agreement with that of Dr. Howland. It had been suggested, however, that some interest would attach to a definition of acidosis from the standpoint of a chemist. Such a definition would be: "Acidosis is a condition in which an accumulation of acids occurs in the body and which results from the failure of elimination to keep pace with the production of acids." It might result, as in diabetes, from an overwhelmingly rapid production of acids, which even a normal eliminating mechanism could not keep up with; or it might, as in some cases of nephritis, result from failure of the eliminating mechanism to dispose of even the amount of acid formed in ordinary metabolism. Whatever the cause, the direct result was that the bicarbonate content of the body fluids was lowered, since the retention of any of the metabolic acids other than carbonic resulted in the decomposition of an equivalent amount of bicarbonate in the fluids. Because of this fact the determination of the bicarbonate content of the blood plasma was the most direct method for detecting the presence and severity of acidosis. So far as their experience went, the severity of acidosis was proportional to the fall below normal of the bicarbonate content of the blood plasma. The most reliable method for the detection of acidosis was the direct determination of the plasma bicarbonate. This was done very simply by acidifying a known volume, usually 1 c.c. of plasma, and measuring the amount of carbon dioxide which was set free. By this method it was found that in the normal adult carbon dioxide gas equal to 55 to 75 volume per cent. of the plasma from which it was set free was present. When this had fallen to 30 per cent. the acidosis was becoming dangerous, and when it fell as low as 20 per cent. it seemed nearly certain to be fatal. In the interval between 55 and 30 per cent. the carbon dioxide determination gave warning of acidosis, although there were likely to be no physical symptoms whatever. The alveolar carbon dioxide was an indirect measure of the bicarbonate content of the plasma. In order to keep the hydrogen ion concentration of the plasma at its proper level, the respiratory center maintained the ratio between the amount of carbon dioxide in the form of free carbonic acid and bicarbonate. respectively, at 1 to 20. Thus a normal plasma contained about 60 volume per cent. of bicarbonate carbon dioxide and 3 volume per cent. of carbon dioxide dissolved as free carbonic acid. If acids accumulated sufficient to reduce the bicarbonate carbon dioxide to 30 per cent, respiration and circulation were normally so stimulated that the carbonic acid carbon dioxide was reduced to 1.5 per cent. The concentration of carbon dioxide gas in the alveolar air was, in accordance with the solubility of carbon dioxide, about twice the concentration of the free carbonic acid in the blood with which the alveolar air was in equilibrium. Consequently in normal individuals there was approximately 60 per cent. of bicarbonate carbon dioxide; in the plasma, 1 to 20, or 3 per cent. of carbonic acid carbon dioxide, and in the alveolar air 6 volume per cent. If the bicarbonate carbon dioxide was reduced to half, the respiratory mechanism reduced the carbonic acid carbon dioxide also to half, and the physical laws of gas solubility also reduced the percentage of carbon dioxide in the alveolar air by half. In regard to the accuracy of this indirect measure, Dr. Van Slyke said it had been their experience that in normal individuals the alveolar carbon dioxide was indicated within a limit of error of about 1 part in 5 the level of the plasma bicarbonate. They had found at the Rockefeller Institute that the same limit of error held for diabetics, so that the alveolar carbon dioxide was of use in diagnosing diabetic acidosis, when it was not desirable to draw blood for the direct determination. Dr. Peters, at the Presbyterian Hospital, however, had found that in other pathologic conditions, as in certain cardiacs, the alveolar carbon dioxide was no measure at all of the plasma bicarbonate, or of acidosis. The value of the alveolar carbon dioxide as a measure of acidosis was dependent upon the normal function of the entire respiratory and circulatory apparatus. Another instance of the indirect measure of plasma bicarbonate was that used by Sellard, Henderson and Palmer. When, as shown by unpublished experiments of Fitz, Cullen, and Stillman at the Rockfeller Institute, the bicarbonate carbon dioxide of the plasma was raised to approximately 75 per cent., a normal individual would excrete an alkaline urine. Consequently the amount of bicarbonate that must be administered in order to turn the urine alkaline was directly proportional to the extent to which the bicarbonate content of the body fluid had fallen below this point. As the alveolar carbon dioxide test depended upon the normal function of the respiratory mechanism, so the alkaline tolerance test depended on normal function of the kidneys.

The determination of the hydrogen ion concentration of the blood, by even the most accurate methods now available, appeared of less value as a warning of acidosis than any of the above methods. The blood hydrogen ion concentration was maintained at its normal level with such extreme tenacity that only after the bicarbonate concentration had fallen to so low a level that the respiratory apparatus could no longer keep the free carbon dioxide down to its normal ratio of one-twentieth the bicarbonate did the hydrogen ion concentration of the blood actually increase; and when this point had been reached the degree of acidosis was severe.

In cases in which acidosis was caused by retarded elimination the urine gave especially fallacious indications of the condition of acidosis. A patient might sink steadily in acidosis toward coma, with only normal excretion of acids and ammonia, and he might turn and begin recovery, when this excretion would become increased, the recovery being apparently a result of the greater excretion. They had seen such a case in which the urinary findings alone would have led to conclusions exactly opposite the truth, in regard to the direction in which the patient was progressing. Without minimizing the value of urinary analyses, it might be stated that they did not show whether acids were accumulating within the organism or not.

Dr. Graham Lusk said there were two forms of organic acids produced from the metabolism of the food stuffs—the acetone bodies, represented by beta-hydroxybutyric acid, and lactic acid. Fats produced beta-hydroxybutyric acid and carbohydrates lactic acid. Proteins produce both classes of acids—beta-hydroxybutyric acid from leucin or tyrosin, for example, and lactic acid from glucose, which might be formed from alanine, glutamic acid and so forth. Dr. Howland has spoken of the possibility of there being other organic acids than beta-hydroxybutyric acid, and it may be interesting to suggest the possibility of the formation of lactic acid in the cases he had cited.

Lactic acid had been found to be a constant constituent of the human blood after exercise (Fries) and after ascending high mountains (Bancroft). In dogs it appeared in the blood after cramps produced by strychnin or after phosphorus poisoning. Spiro's observation in 1877 of the presence of lactic acid in the human urine after exercise had been confirmed by Ryffel and by Hill. Underhill found a large elimination of lactic acid in dogs in consequence of the activity which followed the administration of cocain. He also reported only a slight increase in the ammonia output, the amount of which was usually held to be the criterion of the intensity of acidosis. That lactic acid which was produced under all these conditions was derived from glucose follows from the fact that if one gave strychnin to a depancreatized diabetic dog violent convulsions ensued without any production of lactic acid (Saas), and that if one produced phlorhizin glycosuria in a dog poisoned with phosphorus lactic acid disappeared from both blood and urine. In 1901, Münzer and Loewy administered sodium bicarbonate to dogs poisoned with phosphorus, and in consequence ammonia almost disappeared from the urine, indicating that the urea-forming function was normal. In many ways the children described by Dr. Howland recalled the behavior of dogs poisoned with phosphorus. Possibly a search for lactic acid in this disease, as well as in other pathologic states involving acidosis when the acetone bodies are absent, might lead to new information on this subject.

Dr. L. Emmett Holt said that after listening to a paper like Dr. Howland's the clinician felt himself very much at a loss in discussing acidosis. However, he would emphasize what Dr. Howland had said regarding the frequency of acetone bodies in the urine of children, often without any clinical significance. One of the members of the House Staff at the Babies' Hospital had tabulated 200 consecutive urines examined in young children and found that acetone was present in 30 per cent. of these cases. Acetonuria was found in 70 per cent. of the cases suffering from lobar pneumonia. When a physician sent a sample of urine to the laboratory and he got a report stating that there was a strong reaction for acetone present, he often concluded that his patient was in a serious condition because of this finding, while it was usually of no importance. Again there might be a serious acidosis present with very slight or no evidence so far as the acetone bodies were concerned. A series of cases had been studied at the Babies' Hospital in which three determinations were made—the ammonia nitrogen content of the urine, the carbon dioxide combining power of the blood, and the acetone in the urine. The ammonia nitrogen in the urine ran quite parallel with the carbon dioxide combining power of the blood, but there was no constant relation between these two and the acetone bodies in the urine. Dr. Holt called attention to the occcurrence of acidosis in infants fed for a long time on very high percentages of fats. This was not an uncommon thing. Such children might go on well for a time, when an acute upset would occur with symptoms of marked acidosis, due, it had been stated, and rightly, to loss of bases from the body in combination with the fats in the stools.

The great difficulty in recognizing acidosis seemed to be with reference to early diagnosis. Cases of severe diarrhea with marked acidosis were nearly always fatal and hence they were in need of means by which this condition could be recognized early by the practicing physician. Dr. Van Slyke's test for the determination of the carbon dioxide combining power of the blood seemed to be the most practical for clinical use. It could be made from 1 or 2 c.c. of blood, and with proper apparatus the test could be made in twenty minutes. A sample of blood could be sent to the laboratory, as for the Wassermann test, and it could be made with even less blood than had been mentioned.

Attention should be called to the danger of the development of acidosis in children who had been kept for a long time on a one-sided diet. One such case occurred in an infant fed for many months on a very high protein and low carbohydrate diet.

When the breakdown came a loss of over 6 pounds in weight followed and it was over four months before the symptoms entirely disappeared. This case illustrated the dangers of a one-sided diet and the need of getting back as soon as possible to a properly balanced ration. Excessively high carbohydrates, excessively high proteins, or excessively high fats might all be productive of serious disturbances of metabolism, and the sooner one could place a child who, because of a serious disturbance of digestion, was taking an abnormal diet, back to one in which all the elements of the food were properly represented the better.

Dr. Oscar M. Schloss said that his experience with acidosis had been confined almost entirely to intestinal intoxication in young infants. In a small group of such cases he had determined the carbon dioxide content of the blood, the ammonia content of the urine and the tolerance to sodium bicarbonate. The results of the tests were in accord with those of Dr. Howland and Dr. Marriott. The relatively slight importance of acetone and diacetic acid in the urine was well illustrated in a few cases in which, despite a great reduction of the carbon dioxide of the blood and increased tolerance to sodium bicarbonate, the urine contained no acetone or diacetic acid. The uncertainty of the urinary ammonia as an index to the presence or degree of acidosis to which Dr. Howland had referred had proven true in several of his cases and was in accord with an experiment of Sherman and Gettler. They found that when a subject was fed on a diet productive of high acidity, only a relatively small proportion of the calculated acid appeared in the urine combined with ammonia, while the greater portion was excreted as acid or acid salts. In this connection it was perhaps of interest that the ash of cow's milk had relatively slight basic properties. The cases of intestinal intoxication with marked dyspnea which were admitted to the service of Dr. La Fétra at Bellevue Hospital during the past summer were treated by the administration of large doses of sodium bicarbonate, by subcutaneous or intravenous injection, or by mouth, and by Murphy drip method. There were 42 cases treated, of which 31 terminated fatally, 4 recovered completely, 3 left the hospital in an improved condition, and 3 were taken home unimproved. The fatal cases were of interest in that 16 of the 31 showed very marked improvement. The dyspnea ceased and the general condition of the patients was much improved, so that they all felt that recovery was probable. Death was usually due to a recurrence of the intoxication, which appeared suddenly and was of short duration. It seemed to them that the alkali relieved the symptoms of intoxication, but was without influence on the underlying nutritional disorder.

DR. HERMAN SCHWARZ said they had considered three types of acidosis. The first he said was secondary to a gastroenteric condition. The second one was commonly called recurrent or periodic vomiting, and the third type followed, or occurred in conjunction with, infectious diseases, especially grippe. The last form was secondary usually to an infection of the nasopharynx and had a tendency to recur with other attacks of nasopharyngitis, and was thus mistaken for the true form of periodic vomiting. An interesting differential point was the polymorphonuclear leukocytosis, which occurred in the infectious type, and a lymphocytosis, which was present in cases of true cyclic vomiting, either during the attack or in the interval. Dr. Schwarz said he had studied these three types from the standpoint of the blood sugar content, and from the way the blood sugar reacted upon the administration of sugar to these children. The blood sugar content might either be normal or, when sugar was present in the urine, there might be a hyperglycemia. In the normal child or adult, when glucose was given four to six hours after a meal, an immediate increase in the blood sugar could be noted. This increase rose rapidly, usually well within the first hour, and before two and one-half hours had elapsed the blood sugar content had again reached what it was before the administration of the sugar. With these cases of acidosis, curiously enough, the same rapid rise was noted immediately after the administration of the glucose, but after three or four hours or more the blood sugar might be much above what it was before the administration of the sugar. Impairment of the kidney function might explain this, since it would prevent the elimination of the sugar by the urine or, as had been shown by Dr. Epstein, the ability of the liver and muscles to build up glycogen was either impaired or lost. It was also observed that these patients would retain the glucose when they vomited everything else, and again the acetone and diacetic acid in the urine immediately disappeared for some hours. Some of these cases were given casein, and by this means the acidosis could be made to disappear. Vegetable protein was also tried with success, but this was not chemically pure.

Dr. Wilder Tileston, New Haven, Conn., said he should like to call attention to the contrast between the effects of the same degree of acidosis as measured by the carbon dioxide tension of the alveolar air under different circumstances. Thus the English observers, Kennaway, Pembrey and Poulton, found in diabetes a day or two before the onset of coma a sudden drop to 18 or 14 mm.; they considered values below 25 mm. to indicate a grave condition in this disease and those below 20 mm. to foreshadow imminent coma. On the other hand, Haldane, Henderson and Douglass, at the top of Pike's Peak (14,000 feet), found that the carbon dioxide tension dropped to 18 or 20 mm. as the result of the high altitude without any serious effects. In starvation Benedict found a tension of 26 mm. It was evident that the gravity of the situation did not depend entirely on the degree of the acidosis, but partly on the underlying cause.

With reference to the relation of dyspnea to acidosis, Lewis and his co-workers recently described a type of dyspnea without cyanosis, occurring in elderly people with cardiorenal lesions, in which they found a high degree of acidosis. Nocturnal attacks of dyspnea and Cheyne-Stokes breathing were common. In young patients with uncomplicated cardiac insufficiency, although dyspnea was present, there was no acidosis. Evidently the state of the respiratory center was also of importance, for Peabody found a high degree of acidosis in the terminal stages of uremia without dyspnea, and Benedict, in a man undergoing a prolonged fast, found marked acidosis without any increase in the total ventilation. Also Haldane and Henderson found on Pike's Peak that with acclimatization the dyspnea disappeared, although the low tension of the alveolar carbon dioxide persisted even after descending to a lower level.

Dr. Abraham Jacobi said it gave him pleasure to listen to his pupils and to the pupils of his pupils. If, as they had been told by Dr. Howland, there was very little likelihood of successfully treating these cases of severe diarrhea with acidosis—and they had heard of a number of these cases that had died—it was fitting that he should speak of prevention. What Dr. Howland had said in connection with overfeeding with fats was correct. One cause of acetone and diarrhea was due to excessive fats. There were some doctors who could not overcome the tendency to overfeed with fat, and this was one source of the cases that came to his office: the babies with the pinched, starved look and the aged faces; overfeeding with fat was to be avoided.

Another habit of which many men could not break themselves was that of feeding milk sugar. Babies should not be fed on milk sugar to the extent it had been used. He had never used milk sugar and it should not be used unless in very small quantities, because babies got enough milk sugar in their milk foods. With milk sugar used in any quantity there was always acetone.

Dr. Howland said many babies got better on carbohydrates, and referred to his old treatment. He did not give milk without carbohydrates (barley or oatmeal water). This was the third point that would prevent acidosis and keep them away from a number of death certificates. One should be careful of fats, be careful of milk sugar and remember what had been said about carbohydrates.

Dr. W. McKim Marriott, of Baltimore, in closing the discussion, said that the acetone bodies had received considerable attention in this discussion and that chiefly to minimize their importance. It was to be clearly understood that the acetone bodies, B-oxybutyric and aceto-acetic acid were, in themselves, not essentially toxic and that they could prove harmful to the body only by removing bases. The mere presence of oxybutyric acid in the urine was not more evidence of the fact that the body had been poisoned with oxybutyric acid than was the presence of chlorides that the body had been poisoned by hydrochloric acid. The appearance of the acetone bodies in the urine in large amounts was, of course, evidence that there had been a large production in the body. This increased production, however, might have been completely compensated for by the defenses that the body possessed.

A consideration of the blood gave further information. Dr. Van Slyke had drawn attention to the fact that acidosis might be considered as evidence of the production of acids in the body at a greater rate than they were eliminated. In examining the blood for acetone bodies, it was possible to determine how much acid had accumulated. As an illustration, one of their cases of recurrent vomiting showed the presence of 170 mgm. of acetone bodies per 100 gms. of blood (expressed in terms of acetone). This meant that the blood had an oxybutyric acid poured into it in an amount equivalent to adding to it one-half its volume of one-tenth normal oxybutyric acid. Even this did not mean that the body had been poisoned by oxybutyric acid, for this might have been completely neutralized. The determination did not indicate, however, that the kidneys were not excreting the acid as fast as it was being produced and that a considerable portion of the base of the blood had been claimed by the abnormal acid and that therefore a considerable amount of the alkali in such cases must be administered to supply the deficit. The result of the administration of the alkali in such cases was usually to increase the excretion of acetone bodies in the urine and at the same time to diminish the concentration of the blood, this being coincident with the improvement of the patient.

Dr. Lusk had mentioned lactic acid as a possible cause of the acidosis of nutritional disturbances in children. Following his suggestion they had been looking for excessive lactic acid production in these children. With the methods that had been available with them they were not yet in a position to state positively whether lactic acid entered in as a factor or not. Work was being continued along these lines.

Dr. Marriott said he wished to make it very clear that in the diarrheal diseases of children, acidosis was in itself not necessarily the cause of death; it was probably not the cause of death in most cases. In many cases, however, it was of sufficiently grave character to bring about a fatal outcome. By curing the acidosis one did not cure the primary disease, and even if the acidosis had been completely removed death might, and usually did, occur from the primary condition. By curing the acidosis, however, one factor was removed which might be responsible for death. The indications for the treatment of acidosis in children were perhaps even stronger than in adults, for in the condition that they had been considering the primary disease was essentially temporary and curable as compared with nephritis or diabetes, which in the light of their present knowledge were incurable.

The detection of acidosis was not difficult. The most easily recognized indication was an acyanotic dyspnea, or, more correctly, hyperpnea. In cases in which the deep breathing was accompanied by cyanosis there was a very different condition. Perhaps the simplest laboratory test that could be applied and the one that gave the most valuable information by detecting even slight degrees of acidosis was the determination of carbon dioxide in the alveolar air. Hitherto this method had not been adapted to use in children, but they had so modified it that the gas apparatus might be dispensed with and the determination be carried out in a very few minutes by a person without laboratary training.

The examination of the blood gave valuable information. The bicarbonate reserve might be determined by the method described by Dr. Van Slyke. The hydrogen ion concentration of the blood or the serum might be determined in a few minutes' time and with less than 1 c.c. of material by means of the indicator method. They had recently so modified this that one could determine not only the actual hydrogen ion concentration, which gave evidence of a severe grade of acidosis, but also the bicarbonate reserve of the blood and the carbon-dioxide tension. This method further served to differentiate between an acidosis due to carbon dioxide and to non-volatile acids. No complicated apparatus was required. Sellard's test served to indicate an acidosis of severe degree. Finally the administration of an alkali served both as a diagnostic and therapeutic measure. As an illustration of the value of these methods, within the last week one of the workers in the pediatric clinic had detected the presence of a severe grade of acidosis in 2 patients suffering from conditions in which, so far as they were aware, acidosis had not hitherto been suspected. In one of these cases alkali was administered with pronounced improvement in the symptoms.

To sum up: acidosis was a very grave pathologic condition of frequent occurrence. It is readily detected. The therapy is specific, viz., alkalies.

INHERITANCE OF TUBERCULOSIS—Péhu and Chalier (Archiv. de Méd. des Enf., Paris, January, 1915, Vol. XVIII., No. 1, pp. 1-60) sift the literature on this subject which has accumulated during the last few years, but can find nothing to show that there is any direct inheritance of tuberculosis. The defective development that may be observed in the offspring has no specific character, but the descendants of the tuberculous undoubtedly present a receptive soil for all diseases, not especially for tuberculosis. Transmission through the placenta has been known to occur, but it is so rare that this method of inheritance need scarcely be taken into account.—*Journal of American Medical Association.*

CENTRAL STATES PEDIATRIC SOCIETY

Stated Meeting Held at Chicago, Ill., October 15 and 16, 1915, at Northwestern University Medical School

Dr. R. A. Krost showed a case of microcephalus in a nine months baby and 3 cases of Mongolian idiocy. One child was a negro, the first case in that race that had appeared at the Northwestern Children's Dispensary, although at least a third of all cases at the clinic are negroes, and Mongolian idiots come in very frequently. The 3 cases shown were one, two and four and one-half years old and illustrated the development of children with this condition. Dr. Krost emphasized the benefit in the physical condition brought about by the use of thyroid gland extract; none, or at most little, benefit was noted in the mental state. He had noted no benefit from the use of pituitary gland extract, either the whole gland or the anterior lobe. None of the cases he had observed (25 to 30 in number) had any signs of syphilis or a family history of syphilis.

Two cases of cretinism were shown and contrasted with the Mongolian idiots. One case after a year's treatment was almost normal. Another case not treated until seven years old had improved enough to attend school. Both cases were on thyroid gland extract.

Dr. Joseph Brenneman showed cases of congenital syphilis, illustrating especially the involvement of the nervous system. His cases included a case of tabes in a six-year-old boy and a case of syphilitic hydrocephalus. He also showed a case of amaurotic family idiocy and a case of congenital heart disease.

Dr. Ralph Hamill showed a case of hysterical paralysis following a blow on the head.

Dr. Henry W. Cheney showed a case of anterior poliomyelitis of a year's standing which had a paralysis of left arm and which had greatly improved since the onset of the disease. He also showed a colored boy three years old who had a congenital anomaly in the innervation of the left eyelid, by which it closed synchronously with the closure of the jaw. This caused him to wink his left eye each time he closed his jaw.

Dr. Cheney also talked on the use of vaccine for the treatment of whooping-cough, and told of excellent results in a series of 35 cases in which he had used it. He strongly urged the use of mixed pertussis vaccine in all cases of whooping-cough.

Dr. Wrightman presented a case of poliencephalitis in a child of seven years. Sudden onset with vomiting and convulsions and fibrillary twitchings over right side of body. Temperature first day was 103.5°. The following day right side of body showed paralysis, and two days later face on left side showed paralysis. Babinski present on right side and patellar reflex on same side exaggerated. No atrophy. It is now two weeks since onset and marked improvement has occurred. Child can now walk, but drags right foot slightly. Family history as regards tuberculosis and syphilis negative. No period of unconsciousness at any time. Heart and urine normal.

He also showed a case of congenital angioma simplex. Baby now five months. Scarcely noticeable at birth, but at three months was size of five-cent piece. Situated on right half of upper lip, and involving mucous membrane. No pulsation. Hydrogen peroxid has been injected every fifth day. After four injections the tumor was reduced 50 per cent. and contents now appear to be clotted, as there has been no bleeding except after first injection. Injections to be continued.

His third patient was a case of angioma cavernosum. Child nine months. Tumor very small at first and now size of large olive. Treated with carbon dioxid snow at age of three months without result. Situated just internal to inner canthus of right eye. Pulsates, and can be reduced by pressure. Not suitable for peroxid injections on account of danger of embolus. Such cases show a malignant tendency and usually recur after surgery. Best treated by electricity, employing "Diathermy," which is a form of high frequency.

Meeting held at the Michael Reese Hospital Friday, October 15, at 2 p.m.

Dr. Ernest J. Lackner presented 2 cases of septic polyarthritis and a case of secondary anemia in an infant seven months of age. He called attention to the frequent occurrence of secondary anemia at this time of life and urged the necessity of early recognition and the institution of proper treatment. He also showed a case of typhoid fever treated by sensitized vaccine. He believes that it proved beneficial by reducing the degree of bronchitis.

Dr. Julius H. Hess showed a girl with a tumor occupying almost completely the right pleural cavity. The case was shown at the meeting a year ago as a possible sarcoma. The girl is thriving and the X-ray shows practically the same findings as last year. He also showed three brothers suffering from familial cyanosis. He also showed a premature infant, one of triplets, weighing 850 grams at birth. At six and one-half months it weighed 945 grams. He also showed some improvements on the water-bed incubator, which he presented at the meeting a year ago.

Dr. Isaac A. Abt spoke on the subject of familial jaundice. He presented interesting histories of this condition occurring in two families. In one of the families 3 children died of the disorder shortly after birth and 1 recovered. In the other family 2 children died of jaundice. He also presented a marked case of hyperthyroidism in a young girl and hypothyroidism in an infant seven months of age.

Dr. Solomon Straus read an interesting paper on diabetes in children. He presented a chart showing the effect of protein diet on the production of glycosuria. This patient showed an intolerance of meat proteid, but was able to take eggs.

Dr. Pickman demonstrated her technic for finding worm ova in the stools.

Dr. Emanuel Friend showed a case of unilateral enlargement of the breast in a boy eleven years of age. The enlargement began five years ago and increased until four months ago, when it began to grow rapidly.

Dr. Mark Jampolis presented a specimen of a sub-umbilical abscess from a baby dying of a general sepsis and peritonitis at seven months of age. This abscess was apparently the primary focus.

He also presented a dissection of a child who died of general sepsis, showing localization of pus in the retropharynx, wrist and abdominal viscera. He also showed two specimens—a cyclops and an anacephalic monster.

Dr. May Michael presented an interesting case of meningitis in an infant five months old, due to the colon bacillus. The child recovered. The spinal fluid appeared as a brownish-yellowish pus, DR. ALEXANDER DAY reported his results in the bacteriologic examination of diarrheal stools during the past year. Fifty-nine cases were studied; 6 cases, or 12 per cent., were infectious diarrhea, and 3 showed dysentery bacilli.

DR. JESSE GERSTLEY reported the results that Dr. Day and he obtained in the study of diarrheal conditions associated with coughs and colds—the so-called parenteral infections. They found that if the children were not forced to take food, they rarely developed more than a temporary diarrhea. Charts were shown illustrating the etiologic factors in those cases in which a true nutritional disturbance occurred.

DR. A. LEVINSON presented the results of his studies in the alkalinity of the spinal fluid. He found methyl orange and methyl red to be the best indicators, methyl red being the more sensitive. On account of the comparatively small amount of material at his disposal Dr. Levinson could make no positive statements as to the value of alkalinity tests, but he believes that it may serve as a diagnostic method for diseases of the meninges in the early stages. He also believes that the alkalinity will serve as an index to different types of diseases and also the stage of the disease.

MISS PERRY, dietician of the hospital, reported and illustrated by stereopticon views her results in the study of the caloric needs of the older children in the wards. She found that most of the children cared very little for vegetables.

DR. ALFRED A. STRAUSS reported his method of operation in pyloric stenosis in infants. The technic of operation was illustrated by stereopticon pictures.

Meeting at Children's Memorial Hospital held Saturday Morning, October 16, at 9 A.M.

DR. R. F. AUSTIN and DR. L. D. MINSK reported amaurotic family idiocy in two members of a family.

DR. L. W. SAUER showed a case of cretinism in one of twins. Italian girl, eight years old. The member exhibiting cretinism was a head smaller than her sister. Patient has improved under thyroid extract.

Dr. A. B. Schwartz reported on pachymeningitis hemorrhagica interna. The meningococcus was demonstrated in the spinal fluid of the patient on several separate examinations. The finding indicates the possible infectious nature of the disease.

Dr. H. F. Helmholz demonstrated an apparatus for transfusion into longitudinal sinus. An apparatus for holding an infant's head in a fixed position during infusion or transfusion by the sinus route was shown. The method recommended was that of entering the longitudinal sinus by way of the unclosed anterior fontanel, a procedure that eliminates the usual difficulty of intravenous administration in infancy.

Dr. S. Amberg and Dr. H. F. Helmholz reported upon the detoxifying action of sodium chloride on potassium salts when injected intravenously into guinea pigs.

Dr S. H. Kraft shrowed a case of myatonia congenita (Oppenheim). A baby showing the characteristic findings of the disease was exhibited. The patient was improving under the usual treatment.

Dr. F. S. Churchill and Dr. L. W. Sauer showed by Infant Welfare charts the striking results which were obtained by the treatment of well and sick children in the home, under supervision. The home care of infants was advocated.

Dr. R. S. Austin showed gross specimens of the various meningitides and other museum specimens.

Dr. H. F. Helmholz demonstrated streptococci in duodenal ulcers. In a series of duodenal ulcers seen at the hospital, histologic sections showed the presence of streptococci. The cases all occurred within a short time. This grouping, coupled with the successful reproduction of ulcer in rabbits by the injection of microörganisms isolated from such cases, point to the infectious nature of the disease.

Dr. L. W. Sauer reported on influence of clothing on the insensible perspiration of infants. The insensible perspiration of infants was measured by means of passing a known quantity of air over a definite area of skin, through $Cacl_2$ tubes. Clothing had a marked inhibitory effect on the insensible perspiration.

Dr. A. B. Schwartz showed elastometric determinations in cardiorenal cases. The elastometer detected degrees of edema not appreciated by the palpating finger. The determinations offered a more accurate gauge for studies in water retention.

Dr. D. B. Phemister gave a talk on "Congenital Disturbances in Growth of Bone." He said that congenital disturbances in the growth of bones are numerous and complex, but in general may be classified into two groups, according to the methods by which growth occurs. Increase in length of the bones takes place through the epiphyseal lines by the process of enchondral ossification. Increase in thickness of the shaft occurs from its osteogenetic elements by direct or fibrous bone formation without the appearance of cartilage in the process.

Disturbance in longitudinal growth usually results in shortening, which may be with or without tumor formation. In chondrodystrophia fetalis there is no tumor formation. The disease is present at birth and presents a striking picture. The head and trunk are only moderately undersized, but the extremities present a high degree of shortening. Because of the better developed soft parts the limbs appear fat and plump. The shafts of the bones are very short, but the transverse growth is normal, and pathologic fractures never occur. The failure of longitudinal growth is due probably to a disease of the epiphyseal cartilage itself, which prevents the formation of the proper environment for enchondral ossification. A marked saddle nose is always present, due to the early synostosis of the sutures and lack of development of the bones at the base of the skull.

Most of these children are either born dead or die soon after birth, but some of them reach adult life and possess a normal degree of intelligence. They constitute the majority of the dwarfs which one sees at the circus.

This woman, who is twenty-nine years old and three and one-half feet tall, gives the typical history and presents the findings of a chondrodystrophic dwarf. (Demonstration of patient and X-rays.)

Disturbance of enchondral bone growth with tumor formation results in the condition known as exostoses cartilaginea multiplex. Three features characterize the disease: (1) Arrested longitudinal growth, which is usually slight and disproportioned, affecting some bones, particularly the ulnæ, much more than others; (2) broadening of the ends of the shaft, and (3) the presence of exostoses about the ends of shafts of many of the bones of the extremities and on the bones of the trunk. The skull bones are never involved. The exostoses arise from portions of the periphery of the epiphyseal lines, which become deviated and grow outward, forming spongy, bony tumors with a cartilaginous covering. They appear between the ages of three and ten, increase in size by enchondral ossification through this cartilaginous cap and cease growing by the eighteenth to twentieth year, when the epiphyseal lines close. (Demonstration of photograph and X-ray plates of a case.) Similar isolated tumors are common about the ends of the long bones, particularly the lower end of the femur (adductor spurs) and upper end of the humerus without the presence of the other disturbances.

Dyschondroplasia is a more localized rare disturbance, affecting usually a part of the bones of one or two extremities, but resulting in marked interference of the longitudinal growth. The cartilage of the epiphyseal line proliferates, but fails to go through the formative stages necessary for the occurrence of ossification. The result is an accumulation of hyalin cartilage in a broad zone between the epiphysis and the end of the shaft, simulating an enchondroma. The ends of the shaft are usually expanded, but accompanying exostoses are rare. (Demonstration of photograph and X-ray plates of case in an eight-year-old boy.)

Generalized disturbance in the transverse growth of the bones produces the condition known as osteogenesis imperfecta. In the usual form it is present at birth. The body is usually undersized and the extremities, while of approximately normal length, are very slender and frail. Pathologic fractures are usually present at birth and occur very frequently during the first few years of life If the child survives adolescence they generally become infrequent. There is usually a failure of general bodily development, so that these children become helpless and deformed dwarfs. Examination of the bones shows marked reduction in the diameter and unusual thinness of the cortices of the shafts, with fairly well developed epiphyses. Curvatures and other signs resulting from pathologic fractures are common. This case (demonstrating photograph and X-ray plates of an eight-year-old boy) illustrates a severe grade of the disease. He was put on phosphorus 1/200 gr., *t.i.d.,* with the idea of stimulating osteogenesis and increasing the growth of the bones. After two years there was considerable improvement in his general condition and X-ray plates (demonstration of plates) show the marked influences of the phosphorus, which has caused considerable increase in the thickness of cortex everywhere and the appearance of a broad, dense line in the ends of the shafts bordering on the epiphyseal line and due to the increased enchondral ossification. These changes are identical with those produced by Wegner by feeding small doses of phosphorus to growing animals and furnish the basis for the phosphorus treatment of rickets.

DR. WALTER F. WINHOLT presented a case of a premature infant which showed a positive von Pirquet reaction eleven days after birth. The infant was three weeks premature, and forceps were used at time of delivery. Mother was in advanced stage of tuberculosis, and died of the disease one week after the birth of infant.

Review of literature shows that there are very few cases of positive von Pirquet reported in young infants. Positive von Pirquet reactions have been reported in young infants sixteen days old, seventeen days old, and nineteen days old.

He also demonstrated X-ray plates of miliary tuberculosis of the lungs in infants. Absence of clinical findings of tuberculosis in the lungs was found a number of times, while the X-ray pictures showed that the lungs were filled with foci of tuberculosis.

DR. C. G. GRULEE showed a case of acute hemorrhagic nephritis which has developed following acute tonsillitis. Sixteen days after the onset of tonsillitis the child came to the hospital and was found to have a well-developed nephritis. The tonsils were removed later and showed on culture a hemolytic streptococcus. The cultures from the urine were negative. The child had previously had an old endocarditis, but had completely recovered from the acute tonsillar infection and the nephritis.

In regard to the pus cell content of the urine in cases of pyelocystitis in infants and young children, Dr. Grulee showed several charts in which it was very evident that the temperature curve did not definitely follow a curve based on the number of cells per c.c. of urine. In a general way, however, the number of cells in the urine was a fair index of the severity of the condition.

Dr. Grulee also showed the charts of 2 cases of spasmophilia where the electrical irritability had been distinctly increased by the addition of large amounts of sodium bicarb. and potassium citrate to the food, and had been reduced promptly by replacing these with calcium lactate.

He also showed some milk which had been treated with hydrogen peroxide. This milk was ordinary dairy milk, to which had been added 5 c.c. of hydrogen peroxide to the quart. This was then warmed to 120°F. and heated under agitation. As a result of the breaking up of the hydrogen peroxide and liberation of oxygen and consequent sterilization, this milk would keep as long as two weeks without souring. It was impossible to grow bacteria from it during this time. If any peroxide were left in the milk it was so small an amount that only a trace could be determined by chemical examination. This milk had been used at the Presbyterian Hospital in the infants' diet kitchen for several months with perfectly satisfactory results.

Dr. H. J. Ullmann reported the following observations:

Children who vomit or have gastrointestinal distress at the onset of respiratory infections have the acetone bodies in the urine previous to, or coincident with, the onset. Seven cases are described, 4 having a history of gastrointestinal symptoms with infections. The temperature ran from normal to 104°, with large amounts of acetone and diacetic acid in the urine and all seemed better with the exhibition of alkalies. Three ran temperatures from normal to 104°, had no acetone bodies in the urine and never had gastrointestinal symptoms with infections.

The following hypotheses are advanced: "Children who have gastrointestinal symptoms at the onset of, or accompanying infections of the respiratory tract also have a marked acetonuria and are distinctly benefited by the exhibition of alkalies. Conversely, children who are not subject to gastrointestinal symptoms with these infections do not excrete the acetone bodies to any marked degree. The acidosis is primary and the cause of the gastrointestinal symptoms, not following them, and is a part of the reaction to infections in certain types of individuals."

Professor A. J. Carison, University of Chicago, showed the hunger waves of 2 cases—1 of pylorus spasm with rumination and 1 a congenital pyloric stenosis. In discussing the cases he stated that "pylorus spasm has been ascribed to a great variety of causes, including primary neuroses of the local motor mechanism. The hyperperistalsis of the filled stomach usually associated with spasms of the pylorus may be a temporary condition due to the presence of food in the stomach. On the other hand, if pylorus spasm is simply an expression of primary hypermotility of the entire stomach, this condition of hypertonus and hypermotility should also be in evidence when the stomach is empty. A study of the motor conditions of the empty stomach may thus aid in determining some of the factors involved in hypercontractility of the pyloric sphincter.

"In infants 'rumination' is probably always secondary to chronic vomiting, which in turn may or may not be associated with pylorus spasm. If the vomiting is due to gastric hypertonicity and hypermotility, these conditions should also be present in the empty stomach, with or without the involvement of the pylorus.

"The results on these two infants indicate that pylorus spasm and pyloric stenosis involve either primarily or secondarily a condition of hypertonus and hypermotility of the entire stomach. The excessive contraction of the pylorus may be an expression of this general hypermotility. It is known that the tonus and contractions of stomachs in young mammals are greater than in the adult and in the old. This may be correlated with the greater tendency to hyperactivity of the pylorus in infancy."

Dr. John M. Dodson reported upon the establishment at Rush Medical College of a Post-Natal Clinic, which is to be run in connection with the dispensary. This clinic is to be supplied by patients from the out-patient obstetrical department of the Presbyterian Hospital and Rush Medical College. The objects of such a clinic are primarily to gain a knowledge of the normal baby—its physical characteristics and its proper care as to diet, clothing, bathing, sleeping, and so forth, and this to be taught to students in such a way that they may be grounded in this basically necessary knowledge.

Meeting held Saturday afternoon, October 16th, at Rush Medical College

Address, "Intestinal Parasites in Children," by Henry B. Ward, University of Illinois, Urbana. (See page 116.)

DEPARTMENT OF ABSTRACTS

Original Condensations of Current Pediatric Literature by the Editors and the Following Associates

T. Wood Clarke	Utica, N. Y.
Coleman W. Cutler	New York City
Charles E. Farr	New York City
Morris Friedson	New York City
Gaylord W. Graves	New York City
Howard K. Hill	Philadelphia, Penna.
Jerome S. Leopold	New York City
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Mills Sturtevant	New York City
Samuel W. Thurber	New York City
Eugene F. Warner	St. Paul, Minn.
Edwin T. Wyman	Boston, Mass.
J. Herbert Young	Newton, Mass.

Landsberger, R.: The High Palate: The Deleterious Influence on the Child's Development and its Treatment. (Archiv. für Kinderhk., November, 1915, pp. 113-128.)

In a most interesting article the writer relates the sequelæ of a high palate. The high palate is not merely a local deformity: its consequences affect the whole development of the child's body. In the normal child the palate and the alveolar processes form one uniform spread; in the high palate both the palate and the alveolar processes seem to be distinct; the palate recedes and seems to be superimposed on the processes, which are narrowed.

The high, narrow palate causes a group of symptoms, among which may be mentioned mouth breathing, due to encroachment of palate into nasal space; this leads to all sorts of catarrhal conditions of the throat and bronchi; these children also complain of dryness of throat, especially in the morning on waking; others suffer from continuous spitting, which is especially marked during sleep and in talking. The facial appearance is strange, indifferent, somewhat stupid. The open mouth, the depressed lower jaw, the tired look, the expressionless face give these children a characteristic look.

The soft palate often touches the tongue. The alveolar processes are narrowed and lengthened; speech, therefore, becomes affected; it becomes thick and suppressed; it lacks resonance on account of the nasal obstruction. Stasis of blood and lymph in this region is common; the tonsils and cervical glands become enlarged. There is developed a chamber of negative pressure in the nose which leads to suction action on the tubes and the ears; the air circulation in the ear becomes affected and various degrees of deafness result. Various inflammations and swellings of the tympanum and tube result; this negative pressure also leads to the development of adenoids. Through the obstruction thus caused and the consequent impairment of circulation in this region the circulation of the cerebrum becomes affected and also the whole bony structure of the skull. Intelligence also becomes impaired.

Usually adenoids are blamed for all these symptoms. He believes that adenoids are a result and not the cause of the high, narrow palate and its consequent symptoms. In these cases, when adenoids are removed they inevitably recur. Most writers believe that the high, narrow palate is acquired. The writer, however, believes that it is congenital; he had observed this condition in embryos. He believes that the whole condition is due to abnormal position of the teeth centers in the embryo. In the normal embryo the teeth centers develop obliquely and outwardly over the roof of the nose. In the high palate cases they develop perpendicularly and inwardly.

Nature suggests treatment. An apparatus must be worn which changes the direction of the teeth obliquely and outwardly. Eysell was the first who demonstrated that the nasal space can be increased by orthopedic treatment of the mouth. With the proper orthopedic apparatus all the symptoms, as occlusion of tubes, deafness, asthma, palpitation, headache, salivation, rhinitis, epistaxis, angina, bronchitis, disappear. A healthy growth of the whole body takes place; the disposition and mental attitude change surprisingly, and there develops a greater concentration power for all mental work. The earlier the treatment is instituted the better are the results. Adenectomy should be performed first; this treatment is applicable to the age of sixteen; exceptionally even older children respond to this treatment. When the palatine suture becomes calcified the white fibrous line which is seen at this suture disappears, and this seems to be a good guard for treatment. As long as this white line can be observed the subject is amenable to orthopedic treatment. Treatment is suspended as soon as mouth breathing ceases; mouth breathing disappears in these cases quite suddenly. The whole length of treatment usually lasts from one to two years. The apparatus affects neither speech nor eating. M. S. R.

NETTER, M. ARNOLD: SERUM-THERAPY IN POLIOMYELITIS. (Arch. de Med. des Enf., January, 1916, Vol. XIX., No. 1.)

When the writer first called attention to the unusual frequency of cases of infantile paralysis in France in the summer of 1909, he insisted upon the changes which have occurred in our viewpoint over those previously held. The epidemics which occurred in Norway and Sweden in 1890 showed Medin, and later, in 1905, Wickman, that the disease presented a many-sided character. They called attention to its contagiousness which was already suspected by Cordier of Lyons, and possible modes of contagion. They studied the initial anatomical lesions and verified the opinion held by Damaschino, of the original distribution of the lesions which was diametrically opposed to Charcot's previous views, that the cells of the anterior horn were alone involved.

No less interesting is the experimental production of the disease in monkeys. Thus it seemed that we should be ready to discover a specific therapy. Since October 1, 1910, the author has given for the first time in man a treatment based on experimental research. In October, 1911, before the Society of Biology, and in April, 1914, before the Academy of Medicine, he reported the happy results of injecting into the spinal canal serum from the blood of former sufferers from infantile paralysis, and he now has 32 cases which have received this treatment. He states in which conditions this serum-therapy may be employed, the precise technique, and the possible accidents.

Landsteiner and Popper first showed that poliomyelitis could be transmitted to the monkey by inoculating with fragments of the central nervous system from a patient who had died in the acute stage of the disease. The disease was transmissible from monkey to monkey.

Levaditi and Landsteiner, Leiner and Wiesner, Römer, and Flexner have shown that the serum from monkeys inoculated with the disease, presenting the paralysis, but not dying, is able to neutralize the virus from the central nervous system after contact for a certain length of time.

The author, with Levaditi, was able to show this in human beings. This serum, having this neutralizing power, whether in monkey or man, as Flexner and Lewis have proven, retards or prevents the evolution of poliomyelitis in a monkey inoculated with the virus of poliomyelitis, provided the injections are made into the spinal canal eighteen to twenty-four hours after the introduction of the virus and repeated for several days. If given after a longer interval the serum has no influence upon the subsequent course of the paralysis in the monkey.

At first sight, the result of serum-therapy in monkeys did not predict much success in man. In the monkey, the first symptoms, preceding by ten to twenty hours the first paralytic signs, appeared six or seven days after the inoculation. The injection of the serum, to be of value, should then be given four or five days before the appearance of the first symptoms. A similar plan could not be followed in man. But, happily, there are marked differences between poliomyelitis in man and when experimentally produced in monkeys, which make the serum more valuable in man. The disease has a much more rapid course in monkeys; once started, it usually does not stop; in twenty-four to forty-eight hours all the muscles are involved and death usually occurs one to six days after the onset. Flexner and Lewis found 44 deaths in 60 monkeys, or 73 per cent. In man prodromal symptoms are more pronounced, usually for from two to four days, and the paralysis is usually limited to one extremity or two. Progressive ascending forms are rare, although the cases of Landry's ascending paralysis, collected by the late Madame Finel-Giry, a pupil of the author, and in his service during the epidemic of poliomyelitis amounted to 9 per cent. The mortality in man is much lower. In the epidemic in Paris in 1909 and in New York in 1907 it was 5 to 6 per cent.; in Germany in 1907, 12.3 per cent.; in Norway in 1905, 14.56 per cent., and in Sweden in 1905, 16.7 per cent.

The author collected in a table covering six pages the most important points observed in treating his 32 patients, which were very varied, not only as to age, but in their severity, the parts attacked and the rapidity of evolution. Most of the cases at the onset showed meningitis and the spinal fluid always showed inflammatory reactions. The fact that there were 7 cases of bulbar palsies shows what severe cases the series included.

The cases may be divided into three classes: In Class 1 the first injection of serum was made before the lesions of the central nervous system had become completely developed. In Class 2 the treatment was begun in the course of evolution, when some paralyzed extremities showed that some permanent harm had already been done. In Class 3 the process appeared to have reached its height.

(1) In only 1 case was the author able to give the serum in the true pre-paralytic period, and to retard the appearance of paralysis. This was in a woman twenty years of age, whose brother, aged twelve, had died two days before of bulbar paralysis. The spinal fluid, withdrawn to give the serum taken from a patient who had the disease eleven months previously, showed evidence of inflammation and a count of 32 per cent. lymphocytes, 14 per cent. large mononuclears and 54 per cent. polymorphonuclears, about the usual count in the initial period of poliomyelitis. The author admits that it is impossible to say whether these preliminary meningeal signs would have been followed by paralysis, as many cases escape when not given serum.

(2) Six cases, where the disease had just caused paralysis, were given the serum, the most remarkable case being that of a young man eighteen years old, who developed paralysis of both legs, and who was given 13 c.c. of serum, obtained from a child who had had the disease seven years before. After some relief, a second injection was given of 9 c.c. from a patient whose attack had occurred three months before, and further injections were repeated with marked disappearance of the paralysis and the lack of sensation. Unfortunately the patient died two months later.

(3) Among many cases where a complete paralysis extending over several days existed, one man, aged thirty-two years, was so greatly improved that he could walk in ten days, and a year later was able to take up his military duties.

The complete return of motion in extremities which have been absolutely paralyzed is naturally astonishing, as the paralysis shows an alteration in the motor cells upon which the virus of poliomyelitis attaches itself very rapidly and seemingly finally. But after thought the thing can be explained without difficulty.

The lesions of the cells only advance beyond repair slowly. Every one knows how some of the lesions improve after a few days. Damaschino has found that the primary lesion is not an atrophy limited to the anterior horn, but foci of diffuse myelitis with congestion and perivascular and pericellular infiltration. At this time these alterations are not irreparable and the serum can neutralize the virus, which continues its activity at this stage for several days.

The main point is to act as rapidly as possible. As regards technique, dosage and repetition of injections, Netter found that serum exclusively from human beings previously having had poliomyelitis, in 1 case two weeks before, in 1 case eleven years, and in 1 case even twenty years, had the power to neutralize the virus. The most favorable, however, is serum obtained from three months to five years after the disease.

The serum is obtained by separation from the blood, from veins at the bend of the elbow, with all aseptic precautions, in sterile flasks, and used after positive guarantee of absence of sepsis, the donor being, of course, carefully examined and giving the negative Wassermann test. The patient is placed in a reclining position after the injection so as to allow as thorough a mixing as possible with the rest of the fluid and contact with the several segments of the spinal column.

Human serum seems to offer less difficulties than that of other animals, and the monkey is the only one that is accessible, and they die very quickly and are rarely in a satisfactory state of health. Flexner's suggestion of obtaining serum from the horse having the neutralizing requirements has not yet been possible. The quantity of serum used by the author varies from 5 to 13 c.c. Repetition of the injections is undoubtedly necessary, and by preference eight daily consecutive doses were chosen.

There is an inflammatory reaction of the meninges after the injection, as shown by subsequent fluid examined, with more fibrin and albumin, a larger number of cells and the polynuclear leukocytes predominating. There is occasionally, from this, a pain in the back, muscular hyperesthesia, stiffness of the back and a rise in temperature. In one child, typical urticaria of serum disease appeared nine days after the injection. One child died of a streptococcic meningitis, which began five days after injection and lasted eighteen days.

The author, therefore, reports 6 complete cases, 3 improved cases approaching cure, 7 marked improvements, 5 appreciable improvements but upon whom the influence of the serum is questionable, 3 cases not affected, and 8 deaths, 7 of which were bulbar in type.

Serum-therapy is capable of stopping the devastating march of the paralysis, of causing paralysis already present to disappear, provided it be given early, from the first to the fourth day of the paralysis.

The serum of patients having had poliomyelitis has efficacy for thirty years, but under five years is preferable. The serum obtained aseptically is sterilized by the method of Tyndal and obtained from patients in good health with a negative Wassermann. The injections should be given into the spinal canal and repeated daily for eight days. The doses vary from 5 to 13 c.c.

H. K. H.

STEINERT, E., AND FLUSSER, E.: HEREDITARY LUES AND THE WASSERMANN REACTION. (Archiv. für Kinderhk., November, 1915, pp. 45-112.)

From May 4, 1912, to October 15, 1914, there were examined at the infant asylum of Prague 2,268 mothers and 2,533 infants. Of these, 92 mothers, *i.e.*, 4.06 per cent., gave a positive reaction; 55 of these (2.42 per cent.) gave clinical evidence of lues. Of the infants, 58 (2.29 per cent.) gave a + W. R.; and 47 (1.81 per cent.) gave clinical evidence of lues. In 34 instances both mother and infant gave a + W. R.; mother alone in 58 cases; infant alone in 24 cases; 12 mothers (purely luetic) gave a negative W. R., whose children clinically free of lues were under observation; 3 children gave a negative W. R. (clinically luetic), whose mothers gave a negative reaction, were also observed.

In 1913 Rabinowitsch stated the law that not only are all the mothers of luetic children themselves luetic, but that all children of luetic mothers are luetic. The writers do not believe this to be a fact.

In an extensive review of the subject the writers draw the following conclusions, which, in some instances, are unwarranted by the data presented: (1) In a study of the children of the foundling asylum at Prague, it was found that 5.7 per cent. of these children gave either clinical or serological evidence of luetic infection. (2) All luetic children have luetic mothers. The reverse, that all the children of all luetic mothers are luetic, he could not substantiate by clinical or serological studies. He believes that in every stage of lues a woman can give birth to healthy children. (3) The earliest time at which a gravid woman can infect her infant is seven weeks after infection. (4) 45 per cent. of the children of florid luetic mothers of the second stage remain clinically and serologically free of luetic manifestations. (5) Of 5 mothers who were suffering from tertiary lesions the infant of one of these developed lues. (6) Women suffering from hereditary lues may give birth to luetic children. (7) Mothers with latent lues give birth to luetic children less frequently than women with florid lues. (8) Luetic women can give birth to luetic children at a time when their lues can be neither serologically nor clinically discovered. (9) In children with hereditary lues the W. R. precedes the onset of symptoms. (10) The W. R. persists for a long time after treatment has been instituted in hereditary lues. (11) In infants there is a form of hereditary lues which manifests itself only by the presence of a + W. R. (12) In a few cases with hereditary lues the W. R. may be negative in the presence of florid symptoms. (13) In the first weeks after delivery there are found variations in the W. R. in these women. A woman who at delivery gives a positive W. R. may within two weeks give a negative reaction and *vice versa.* A positive W. R. occurs at times in women, *"die keine anhaltspunkte für lues bieten."* (14) The findings of a + W. R. in non-luetic children is a rarity; in these cases the reaction disappears quickly without treatment. In rare cases a + W. R. is found in infants suffering from acute infectious diseases.

[With all due respect to the writers of this article we beg to state that the conclusions cannot be accepted, because the children and mothers had not been observed for a long enough period; possibly there may have been some error in the technic of the W. R.] M. S. R.

DABNEY, VIRGINIUS: TRUE MYXOMA OF THE RHINOPHARYNX. REPORT OF 2 CASES. (Annals of Otology, Rhinology and Laryngology, September, 1915, p. 530.)

These cases are reported on account of the extreme rarity of true myxoma in the rhinopharynx. The first one is in a girl of twelve years, who had been having some difficulty in respiration for about two months. Nothing could be made out until the soft palate was drawn forward and then a smooth, grayish tumor was seen resting upon it. Under ether, a digital examination was made and the attachment shown to be to the basilar process. The tumor resisted efforts to remove it, but it was finally brought away *en masse* by the use of a large adenoid curet. It was nearly round and an inch and three-quarters in diameter. No recurrence had taken place in ten months. The second case reported occurred in a girl of nineteen years, who had noticed symptoms for about a year. She was pale and neurotic. Under general anesthesia two tumors were made out—one attached to the basilar process and the other to the left posterior ethmoid region and was the larger. Both were devulsed by the use of adenoid forceps and found to be one inch in diameter in the first case and two inches long by three-quarters of an inch wide in the second case. This second girl had had a growth removed eleven years before, which had a more fibrous character. In her case there has been no new recurrence in five months. S. W. T.

JACKSON, JOHN B.: TUBERCULOSIS IN CHILDREN. (Journal of the Michigan State Medical Society, December, 1915, p. 597.)

The subject of this paper is presented under three sub-heads, viz.: (1) The widespread prevalence of this disease as proved at autopsy. (2) The significance of the tuberculin reaction. (3) The reaction of clinical tuberculosis in the adult to infection during childhood.

Autopsy findings are as follows: Medin, 7,630 autopsies, 8½ per cent. infected under one year. Hamburger, 401 autopsies, 40 per cent. infected under fourteen years; 42 per cent. from one to two years; 59 per cent. from two to four years; 60 per cent. from five to six years; 64 per cent. from seven to ten years. Naegeli, 501 autopsies, 97 per cent. infected under fifteen years.

Under the heading Tuberculin Reaction the author states that age plays a very important rôle. Newborn infants do not react. According to A. Brown, 90 per cent. reacting under two years to the von Pirquet test have active and fatal tuberculosis. Hamburger says that tuberculosis may be compared to syphilis, and describes a primary, secondary and tertiary stage, childhood usually being the time when primary infection occurs. Baldwin, in his recent article on "Allergy and Reinfection in Tuberculosis," reviews the work of von Pirquet, Roemer, Hamburger and others, and concludes "that childhood is the time of infection and youth the time of super-infection and that from extension of the primary disease." Pottenger says that "the usual clinical history of patients suffering from tuberculosis, when carefully analyzed, leaves little doubt that the disease as it presents itself is either a new activity in or an extension from an old focus."

Children with a cough, anemic children, poorly-nourished children, those who have frequent fevers, children with enlarged glands or obscure bone and joint pains, in fact all children who fall below the normal standards of physical vigor and continue to do so, should be carefully examined for evidences of tuberculosis. Frequent elevations of temperature and rapid pulse are often evidences of tuberculosis. A prompt von Pirquet reaction under three years of age must be well-nigh conclusive evidence of active tuberculosis. In older children reactions that are prompt and marked must be recognized as of great importance in diagnosing these cases. The X-ray is only of use when the lesions have advanced to a stage sufficient to cause shadows.

Vaccination holds the greatest hope for the future. The experimental studies of immunity made by such men as Koch, Behring, Maragliano, Wright, Roemer, Wolf-Eisner, Calmette, Spengler, Trudeau, Von Ruck and others, and the very interesting reports by the use of the living bacillus made by Webb, are blazing the way for one of the greatest boons to the human race, the production of a positive immunity. E. F. W.

BOOK REVIEW

Painless Childbirth, Eutocia and Nitrous Oxid-Oxygen Analgesia. By Carl Henry Davis, A.B., M.D., Associate in Obstetrics and Gynecology, Rush Medical College, in affiliation with the University of Chicago; Assistant Attending Obstetrician and Gynecologist to the Presbyterian Hospital, Chicago. Chicago: Forbes & Co., 1916.

This little book of 134 brief pages most opportunely follows the violent lay newspaper hysteria of last year in regard to painless childbirth. In it the author, in a sane manner, traces back the history of eutocia from earliest Greek times to the early nineteenth century, when chloroform and ether were introduced. The book contains chapters on Chemicals and Their Effects, Nitrous Oxid and Oxygen in American Obstetrics, Objections to Twilight Sleep, Advantages of Nitrous Oxid-Oxygen Analgesia, Eutocia, Obstetrical Facts and Statistics, Unnecessary Mortality, Nitrous Oxid-Oxygen Analgesia in Obstetrics, Technic of Administering Nitrous Oxid-Oxygen Analgesia in Normal Obstetrics, Reasons for Failures in Securing Analgesia, Nitrous Oxid-Air or Nitrous Oxid-Oxygen, A study of 154 Consecutive Deliveries, Conclusions.

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ORIGINAL COMMUNICATIONS

PROLONGED USE OF TUBES FOLLOWING DIPHTHERIA, WITH REPORT OF A CASE

BY ALBERT J. BELL, A.B., M.D.

Visiting Staff, Contagious Group, Cincinnati General Hospital

On December 1, 1914, J. F., aged one year, was admitted to the Contagious Group of the Cincinnati General Hospital, suffering from laryngeal diphtheria, with a history of having been sick about two weeks. On admission the child was seen to be decidedly toxic, the temperature was 103.2°, the pulse 140 or more and the respirations of the Cheyne-Stokes type. There was marked retraction of the chest wall upon inspiration. No membrane was visible upon the tonsils or pharynx; 20,000 units of antitoxin were given into a vein and 5,000 into the thigh.

When seen by me, the child appeared to be almost moribund, the respirations, as previously mentioned, were of the Cheyne-Stokes type. I felt that there was a respiratory failure due to the general toxemia and my first impression was that it was useless to attempt anything further for the child. However, it was decided to accept a possible chance and intubation was attempted. The tube unquestionably entered the larynx, but instead of passing through the membrane must have pushed it down. The little patient ceased to breathe and went into profound collapse. The pulse could not be felt, nor the heart sounds heard and for several minutes the child appeared to be dead.

A low tracheotomy was done, artificial respiration performed and stimulants given. Our efforts were finally rewarded by seeing the patient commence to breathe, at first with only mechanical gasps, due to the manipulations, and then by the return of the pulse.

After breathing commenced, sufficient air entered the lungs, but a most distressing cough kept up for a half hour or so. This was immediately relieved by allowing two or three drops of a 2 per cent. cocain solution to run down the tube. This feature was easily relieved by a similar procedure for the first two or three days. After the fourth day the cough was not troublesome. For several days camphor and ether oil, ♏ vi, and atropin sulphate, grs. 1/300, hypodermically, were given every three hours.

Culture from throat on first day doubtful. On the fifth day, culture from tube showed A, C, and D types, viz., positive. Next day culture from tube was negative. About one month after admission to house, throat culture showed A, C_2 and D_2, viz., positive. After this all throat cultures (five in number) were negative.

Steam inhalations and tent were used from the start.

For several days rectal feeding was resorted to, because of tendency to choke. Mixtures tried per rectum were peptonized milk, concentrated beef juice and peptonized milk, 5 and 10 per cent. solution glucose in normal salt, with small amount of sodium bicarb. added. The peptonized milk was most successful.

On fifth day in the house a very slight amount of air entered through the larynx when opening of tube was closed.

On seventh day tube was removed for fifteen minutes. Although some air entered through normal passage, nearly all the breathing was through the opening in neck. When the finger was placed over the wound, the child became cyanosed. The patient always did better when lying on her back, with shoulders elevated and head retracted in mid-line.

On ninth day 20,000 units of antitoxin was given in right thigh on account of the large edematous swelling of fauces, which mechanically interfered with feeding. This condition improved the following day.

Between ninth and twenty-first day there was no change in tube situation. At this time the little patient became quite restless and rather somnolent, the respirations were feeble and the general condition poor. We felt that "to drop cocain into the tube at her discretion for control of coughing," an order from one of the house officers to the night nurse, suggested the etiological factor. Improvement was noticed in two or three days. Paregoric, camphor and ether oil and tr. of strophanthus were administered at intervals.

On twenty-eighth day of disease the child's temperature was normal for first time, pulse 80, respiration about 40. Daily efforts had been made to encourage the child to breathe through the larynx, but without much apparent success. The insertion of a tube into the larynx for the purpose of dilatation was decided upon. Morphin sulphate, grs. 1/30, hypodermically, three times in the twenty-four hours, was given for a day or two, as a preparatory measure.

On the twenty-ninth day the patient's general condition was excellent. The interne's note is as follows: "The finger was placed over the opening of tube and a sudden pressure applied to chest wall with the result that the child uttered a distinct cry and coughed several times. Encouraged by the 'voice from the dead,' this was successfully repeated every few minutes for half an hour. When the opening in the tube was closed, the patient breathed quietly for quite a while." It may be mentioned here that this "training" was repeated very patiently every day for several days.

Two attempts made on different days by one of the staff to insert the smallest-sized tube into the larynx were viewed by him with feelings of uncertainty. However, because of the almost immediate improvement following this procedure, I believe that the tube did enter the larynx. On the thirty-first day in the house the tracheotomy tube was removed permanently and the child had no further difficulty in breathing through the larynx.

Without warning or physical signs to account for it, two days later the child developed a subnormal temperature and typical Cheyne-Stokes breathing. Camphor and ether oil, caffein sodium benzoate and atropin sulphate, grs. 1/300, hypodermically, were given at intervals. The stimulation improved the pulse, which was irregular at times and showed signs of cardiac failure. A macular eruption appeared next day about the neck. The above suggested an anaphylactic reaction, although the last antitoxin had been given three weeks previously. Thinking that it might come from the food, everything but brandy, and, later, barley water, was discontinued. The Cheyne-Stokes respirations disappeared, but returned again later. In about thirty-six hours we returned to the old milk formula. All unfavorable symptoms had disappeared about forty-eight hours from onset.

20,000 units more of antitoxin (making in all 65,000 units) were given on the thirty-fifth day in the house. At this time the throat cultures were still positive. In several instances I have seen marked improvement follow late doses of antitoxin.

After this, further progress was uninterrupted. There were no paralyses of any variety, phonation was normal and the child was discharged in excellent condition, after having been in the hospital for two months.

The above very interesting and in many respects remarkable case furnishes a basis for observations upon special therapeutic measures applied during its course and upon stenotic conditions of the larynx, following diphtheritic inflammations, in general.

In passing, it may not be amiss to refer to the apparent hopelessness of this child's condition at first and to derive some moral encouragement from it. We were confronted with a history of two weeks' previous illness, a toxic, somnolent state, marked difficulty in breathing and of the Cheyne-Stokes type. The result, however, shows that our efforts were worth while.

In this case, our attention is first called to the very distressing cough, which frequently accompanies the presence of a tracheal tube. This may last for hours and jeopardize the life of the child at a time when absolute rest and sleep may mean the salvation of a greatly weakened myocardium. This was relieved by the dropping of a 2 per cent. solution of cocain down the tracheal tube at intervals. Our experience shows that this should be done only by the physician or under his direction and not left to the discretion of the nurse. Accompanying this for several days camphor and ether oil, ♏ vi, and atropin sulphate, grs. 1/300, hypodermically, were given every three hours.

A very marked edematous condition of the fauces was relieved by a late dose of antitoxin subcutaneously (20,000 units on the ninth day).

The early dose was given intravenously, as otherwise it would have been practically useless in a neglected case of this character. Attention is also called to a dose of 20,000 units of antitoxin given on the thirty-fifth day because of positive throat cultures, which almost immediately became negative and remained so. Although apparently contrary to general principles, we have done this occasionally with good results.

During the several periods in which our little patient showed signs of cardiac or respiratory failure, as evidenced by a weak and irregular pulse and Cheyne-Stokes breathing, injections of camphor and ether oil and atropin sulphate uniformly brought about good results.

The ingenious method of "training" instituted by one of the house staff is worthy of special comment. By forcing the use of the vocal chords, it established a "good habit," restored the confidence of the patient and eliminated attacks of spasmodic dyspnea.

Before again referring to our case, let me briefly enumerate the causes responsible for the prolonged use of laryngeal and tracheal tubes and some of the methods devised for relieving the underlying conditions.

The usual literature at our command is practically silent upon this subject as far as useful information is concerned. We may, however, gather the following causes which necessitate the brief or prolonged use of tubes: Diphtheritic exudate, or its long persistence in larynx or trachea; edema of tissues; ulceration of cricoid cartilage and consequent collapse of thyroid cartilage; cicatrical contractions and exuberant granulations following ulcerations; and abductor paralysis (Sajous).

The most common cause for prolonged use of tubes (Rogers) is a hypertrophic laryngitis, viz., an exudative and productive inflammation causing a vascular, edematous thickening of all the intralaryngeal soft parts due to the diphtheritic inflammation. It is interesting to note that this same authority says that ulceration and cicatrices, exuberant granulations and the wearing of the intubation tube in the larynx are rarely responsible for the stenosis.

I think, however, we would do well to include among the causes too tightly fitting tubes, heavy metal tubes, leaving tube in too long, and unskilled operators.

Among the prophylactic measures for counteracting the injurious effects of prolonged intubation and allaying inflammation, Fischer has suggested the use of a relatively small tube coated with equal parts of shredded French gelatin and glycerin; ichthyol one part and water ten parts. This is melted in a water bath and the tube dipped into it and allowed to dry. By steaming the tube, the excess of gelatin can be made to dry off. With this we have had no experience.

Where the stenosis of the larynx is complete and persistent, the wearing of a laryngeal tube is a necessity until relieved, unless frequent autoextubation becomes an ever present danger, when tracheotomy has to be performed—usually as an emergency operation. The treatment consists in dilatation of the larynx with tubes *gradually increasing* in size. In simple cases the ordinary O'Dwyer tubes may be worn, the treatment being carried out preferably in a contagious hospital. Where the tube is continually coughed up, endangering the patient's life, a tracheotomy must be performed, if not already done, and the tracheal cannula worn, with occasional dilatations. These involuntary extubations suggested the "plugged or clamped" tubes to Dr. Rogers. These consist of special intubation tubes, into the anterior part of which a plug is screwed or a clamp placed so that it will project vertically out through the tracheal opening, making it obviously impossible for the tube to be coughed out. A simple method was employed by Dr. Samuel Iglauer, of this city, who reported his case in a recent issue of one of the current magazines. As this case illustrates some interesting features, I will refer to it briefly: The child was intubated at the Contagious Hospital, but autoextubation occurred a number of times, and on one occasion an emergency tracheotomy was performed. Complete stenosis of the larynx followed in this child and during a period of several months the treatment included laryngostomy, the use of the Rogers' special tubes, plugged and clamped, which latter were finally discarded in favor of an ordinary hard rubber intubation tube with a groove cut around the neck. A silk thread tied around this groove projected through the tracheal opening and was fastened to the sides of the neck by means of adhesive plaster, thereby preventing autoextubation.

This simple procedure of Dr. Iglauer's could be more easily applied and, generally, should be more satisfactory than either the plugged or clamped tubes.

A good result was obtained in this case.

Dilatation, cutting of cicatrices, etc., has at times to be done under chloroform or ether anesthesia. Treatment may consume many months.

Our own case presented few, if any, of these most trying conditions, which call forth the utmost patience and skill of the specialist, but, aside from some very instructive features, it is presented more for what was *not* done in the way of instrumentation than what *was* done. The tracheal tube was not removed permanently until a full month had passed, so that it may certainly be said to have entered upon the "prolonged tube stage." There was almost no dilating. Premature or unwise instrumentation may bring about the opposite result than the one desired. Time, patience and close attention to details were responsible in this case. We were probably dealing with an acute edema at first and after this subsided, with the psychic condition which is so much in evidence in all cases, regardless of age.

I wish to thank Drs. Stammel, Coppock, McGowan and the nurses in the Contagious Group for their interest and help in the management of this case.

TUBERCULOUS HIP DISEASE—P. W. Nathan (Journal of American Medical Association, 1915, Vol. LXIV., p. 1,732) bases his remarks upon a study of about 200 cases in which particular attention was given to results after such an individual had used his affected hip during adult life. Tuberculosis of the hip is a destructive disease, which practically always leads to marked impairment of the joint structures. So far as we know, there is no treatment which will prevent or limit the destructive process and we have not, therefore, a method which will prevent permanent impairment of joint function. Such being the case, we have no adequate treatment for hip disease. For the present, we must be content to choose the method which will give the patient the strongest limb to stand and walk on, irrespective of joint motion or shortening. At present the treatment with the short plaster-of-Paris spica, with all its shortcomings, is better than any other heretofore in use, provided it is scientifically carried out.—*The American Journal of Obstetrics.*

MULTIPLE DEATHS IN THE NEWBORN OF ONE FAMILY*

BY CHARLES HERRMAN, M.D.

New York City

The father of this unfortunate family is apparently healthy. The mother has slight gastric disturbances; she has been repeatedly examined by well-known clinicians and found free from pulmonary, kidney and uterine disease. The blood has been tested a number of times and the Wassermann reaction has always been negative. There have been no miscarriages or stillbirths. The father's blood also gave a negative Wassermann reaction. The mother has been married nineteen years and has had eight children. The first died at two weeks of pneumonia. The second is a girl, now fifteen years of age, somewhat anemic, but otherwise healthy. She received the breast six months, and had no digestive or pulmonary disease during infancy. The third child died at two weeks of pneumonia. The fourth died at ten weeks of pneumonia. The fifth lived eleven months and died of pneumonia. The sixth died at two weeks of pneumonia. In none of these was the labor in any way abnormal; the babies were apparently healthy at birth, were above the average in weight, they took the breast milk well during the first ten days, and had no digestive disturbance. The seventh child was born November 30, 1911, well developed, weight ten pounds. Labor was normal. It nursed well for eleven days, then suddenly became restless, had slight distention of the abdomen, and slight cyanosis. It was admitted to the Lebanon Hospital December 15th, and examination showed a well-nourished baby weighing ten pounds, with increased frequency of respiration and cyanosis. Temperature 101.6°, physical examination revealed areas of consolidation on both sides of the chest, especially the right. The child died twelve hours later and the post-mortem examination showed a pleuro-pneumonia. There were no evidences of syphilis or tuberculosis, no enlargement of the thymus, lymph nodes or spleen. The eighth child was born in the Lebanon Hospital on September 8, 1915. The labor was normal; there was no cyanosis and no difficulty in breathing; the weight was ten pounds three ounces. On the eighth day it began to sneeze and on the tenth day had a slight cough. It took the breast well. The baby left the hospital on September 20th, in good condition, weight ten pounds. On September 23d, I was called to see it, not because it was very sick, but because, owing to her previous unfortunate experiences, the mother was exceedingly anxious. I found the child with a temperature of 101.2°, pulse 130, a slight rhinitis and bronchitis, but no cyanosis, no marked increase in the frequency of respiration, no distinct evidence of pneumonia. It did not take the breast quite as well as usual, but the child did not look very ill. On the following day, however, the temperature rose to 104°, pulse 140; the respiration rate was distinctly increased, and examination of the chest showed signs of a beginning pneumonia, especially on the right side. The weight was ten pounds four ounces; the patient was referred to the hospital. Blood cultures made at this time were negative. On September 25th and 26th, there was a slight improvement in the child's condition, but on the 27th the temperature again rose to 103°, the pulmonary symptoms became more marked. Blood cultures were again negative. The child grew gradually worse and died on September 29th, at the age of three weeks.

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* Read before the Harlem Medical Association, October 6, 1915.

It is remarkable that five of these newborns were taken sick at about the same age, namely, from ten to twelve days, with the same symptoms, mild catarrhal manifestations in the upper respiratory tract; the disease ran the same course, and ended fatally in from five to six days in each. The labors were not difficult, the babies had no cyanosis or disturbances of breathing at birth. Some of the babies were born at home, some in the maternity ward. There is no reason to suppose that the hygienic conditions were at fault. At the time the last baby was in the maternity ward, there were no other cases of infection in the newborn. All the infants were breast-fed exclusively, none had any distinct digestive disturbance. As to the possibility of the mother's milk being toxic, aside from the fact that the presence of such toxic substances in the milk of healthy women has never been demonstrated, two of the children, namely, the second and the fifth, received the breast milk for six months without presenting any disturbances, and the clinical picture was that of a descending respiratory infection, not that associated with "alimentary intoxication" or an anaphylactic reaction. In view of the fact that seven of eight children died of pneumonia, five during the first three weeks, we are justified in assuming an unusual susceptibility of the respiratory tract in these infants, and this susceptibility must have been congenital. The possibility of the mother acting as a "carrier" was considered, and cultures made from her throat showed a marked preponderance of streptococci; but as the blood cultures of the infant were sterile there is no definite evidence that the mother infected her infant.

Such a distinct susceptibility to certain infections, such a distinct vulnerability of certain organs, is not so infrequently noted in certain families, although the number of individuals affected is usually not so large as in the present case. Why is it that in an epidemic of scarlet fever, only certain children have a complicating nephritis; in an epidemic of measles, a complicating pneumonia? Why is it that of 100 infants fed on proprietary foods, only one gets scurvy? In all these we must assume such an individual susceptibility, a point of least resistance in certain organs. Such peculiarities are frequently congenital. For example, I have called attention to the fact that sprue in the newborn is sometimes the earliest and at the time the only manifestation of the so-called "exudative diathesis." The wonderful discoveries in bacteriology during the last twenty-five years have focused attention on agencies outside the body as the important factors in the causation of disease, and have led, I believe, to a neglect of the study of the individual's personal equation.

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COMPARISON OF ADULT AND INFANT TYPES OF GONOCOCCI—According to Pearce (Journal of Experimental Medicine, Lancaster, Pa., April, 1915, Vol. XXI., No. 4, pp. 289-400) two principal types of gonococci may be recognized by suitable immunologic tests; namely, agglutination and complement fixation. These two types correspond to the adult and infant types of infection with the gonococcus, seen clinically. On the basis of the immunologic reactions of agglutination and complement fixation the strains of gonococci isolated from 3 cases of ophthalmia are classed with the adult type. A polyvalent antigen for the serologic diagnosis of a gonococcus infection should represent strains of the infant type of organism in order that both types of infection, infant as well as adult, may be recognized.—*Journal of American Medical Association.*

FEVER—THE INITIAL SIGN OF TUBERCULOUS INFECTION IN INFANTS *

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In a paper "On Observations of Milk Station Infants," read before this section in January, 1914, we called attention to the fact that in case of infants who are doing well, who suddenly stop gaining in weight and have an acute febrile reaction, we should always suspect tuberculous infection. We looked upon this febrile reaction as the initial sign of tuberculous infection in infants.

In 1912 and 1913 we carried out the von Pirquet reaction on about 300 infants; eleven of these gave a positive reaction; in three of these we had the opportunity to observe the initial fever. Six of the mothers whose previous infants gave a positive reaction when tested in a routine way, presented themselves at our milk station in the last two years with newborn infants; three of these we were able to observe for one year; as infants who live in tuberculous surroundings and who come in close contact with those afflicted with tuberculosis, almost invariably become infected, an opportunity presented itself to us of studying these three cases from early infancy. In each one of these cases the mother was tuberculous. We performed the cutaneous tuberculin reaction on these infants about once every month and found is always negative as long as the infant was gaining in weight and had no fever; however, with the onset of fever we obtained a positive reaction in two of these cases, and a positive reaction in the third after the fever had lasted one week.

The idea is prevalent that the tuberculin reaction is an anaphylactic reaction; and that a normal person (*i.e.,* individual free of tuberculosis) will react with tuberculin, if he had previously been sensitized with it (*i.e.,* tuberculin); thus Vaughan, Zinsser *et al.,* are of the opinion that a positive Wolff-Eisner or Calmette reaction can on repetition be obtained in a normal individual; as the correct understanding of the significance of a positive tuberculin reaction, after repeated negative reactions, is essential for the proper interpretation of the nature of the fever in the cases to be discussed, we must consider this phase of the subject more fully.

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* Read before the Pediatric Section, New York Academy of Medicine, January 13, 1916.

It is generally believed, when an animal previously injected with the same substance, that the antibodies induced by the first injection are reinforced and that a continuation of the process will lead to a high degree of immunity. Under certain circumstances this is not the case, because severe and fatal symptoms may set in after the second injection, showing that instead of being immune the animal is indeed hypersusceptible or hypersensitive to the effects of the antigenic substance; to this state of hypersensitiveness Richet applied the term of anaphylaxis.

When a foreign protein is introduced into the animal body, usually parenterally, after a time, a specific hypersensitiveness of the animal for this protein will appear. After a definite interval, a second injection of the same substance, harmless in itself, may produce an itching rash and fever, or violent symptoms of illness, and rapid death may occur. The first injection of the protein produces no symptoms, but serves to alter the power of reaction on the part of the body cells, by rendering them unusually sensitive or susceptible to the same or closely allied foreign proteins. Sensitization, therefore, is the process of rendering body cells hypersensitive, by administering a foreign protein; the toxic substance, which is believed to be formed at the time of reinjection of the protein and is regarded as responsible for the lesions and symptoms of anaphylaxis, is called anaphylatoxin; and the second inoculation dose is often spoken of as the intoxicating dose.

The question before us now is, "Is it possible to sensitize a normal individual (*i.e.*, an individual not infected with tuberculosis) to tuberculin, so that, on reapplication of the test, he will give a positive reaction?" Zinsser, Vaughan and others believe this to be a fact; we, on the contrary, believe that overwhelming evidence (pathologic, clinical and experimental) can be adduced against this assumption. That the tuberculin reaction depends on the presence within the body of a tuberculous focus has been more than amply proved; there is not a single authentic case on record in whom a positive tuberculin reaction was obtained during life, who did not on autopsy reveal the presence of a tuberculous focus somewhere in the body; in a few cases, where no macroscopic lesions were found, the microscope revealed the presence of miliary tubercles; in cases in which neither macroscopic nor microscopic tuberculous lesions could be demonstrated, injection of emulsions of lymph glands (bronchial, cervical and mesenteric) derived from the patient, into guinea pigs invariably led to the development of tuberculosis in these animals.

Harbitz, Weichselbaum and Bartel have observed on autopsy children who showed neither macroscopic nor microscopic tuberculous lesions, but in whose organs virulent tubercle bacilli could be demonstrated; injection of these organs into guinea pigs produced tuberculosis in these animals; children who harbor these virulent tubercle bacilli, but present no anatomical lesions, fail to give a tuberculin reaction; further evidence that the tuberculin reaction depends on the presence within the body of a tuberculous focus.

All anaphylactic antigens are proteins; tuberculin is not a protein; one can grow the bacilli on protein-free nutrient and thus produce a protein-free tuberculin (which does not give any protein reactions), but which in tuberculous patients will produce a positive reaction; the active principle of tuberculin produced in this way is a polypeptid, and polypeptids do not produce anaphylaxis.

The symptoms which are produced by tuberculin treatment of a tuberculous patient are not identical with those seen in other forms of anaphylaxis (as in white of egg or serum); death is seldom sudden and there is lacking the diminution of complement and the distention of the lungs which are invariably seen in other forms of anaphylaxis. There is also evidence at hand that tuberculin hypersensitiveness cannot be transmitted from one animal to another in a passive manner (*i.e.,* through the blood) as in other forms of anaphylaxis; a fact which has been demonstrated in human beings; for infants born of tuberculous parents do not give a tuberculin reaction, unless they have a tuberculous focus. Recently some observers were able to transmit tuberculin hypersensitiveness in lower animals in a passive manner, but their findings are uncorroborated. There are differences also in the general and in the local reaction to tuberculin and in that seen in anaphylaxis due to serum.

The systemic reaction in a tuberculous patient treated with tuberculin does not develop as readily as in other forms of anaphylaxis, and skin rashes, a rarity in the former, are seldom absent in the latter.

In guinea pigs sensitized to serum Müller could not obtain a local reaction which resembles the tuberculin reaction. In man the serum reactions and the tuberculin reactions show great differences. In a tuberculin reaction we can often differentiate a papule and a surrounding areola; in serum local reaction, no such differentiation as a rule can be made; here the greatest inflammation is at the periphery.

If you inject into a human being, who is not hypersensitive to foreign serum, about 0.1 c.c. of some foreign serum intracutaneously, and repeat this daily, you observe, after an incubation period of 4-9 (mostly 5-7) days, a positive reaction. The incubation period in serum anaphylaxis is never absent. If serum is injected into a person who had a previous injection of serum, the incubation period is shorter; but it never is entirely absent. With tuberculin it is not possible to produce a local reaction in a patient free of tuberculosis, even if it be repeated any number of times; but in a patient who is tuberculous an intracutaneous tuberculin injection increases the local hypersensitiveness to tuberculin. If repeated tuberculin injections are made you increase the local hypersensitiveness, and this increased sensitiveness takes place without any incubation period.

In the tuberculin reaction, the maximum of the inflammatory reaction is always in the center and diminishes in intensity towards the periphery; whereas in serum local reaction the periphery is the seat of greatest inflammation; in certain cases, after subsidence of the reaction, there is an increased antibody formation, and there is a renewal of redness on the *periphery* first (phenomenon of wreath formation of Bessau). This phenomenon is never observed in tuberculin reactions, not even in a stage of greatly increased tuberculin hypersensitiveness. If one repeats the serum intracutaneous local reaction, one obtains a stronger reaction every day until a reaction of maximum intensity is produced; then the reaction begins to decline, and after a certain length of time no further reactions can be obtained.

In tuberculin local reactions this is not the case; in a tuberculous patient the reaction increases in intensity with each injection, and after it has attained its maximum it remains constant at a fairly high level of reaction. (In an experiment of this kind on a tuberculous child, Bessau found that the child still reacted to tuberculin after 117 von Pirquet tests had been made, but had failed to give a serum reaction after 30 serum injections.)

Katanaphylaxis can be induced only in serum anaphylaxis but not in tuberculin hypersensitiveness.

Histologic study of a local tuberculin reaction shows its great resemblance to tuberculous tissue. This specific histologic character of the local reaction cannot be produced in a person free of tuberculosis; at times a pseudo-reaction is observed, but this has been shown to be caused by the glycerin bouillon used in the preparation of the tuberculin, for a 4 per cent. glycerin bouillon preparation concentrated to 1-10 its volume gives the same pseudo-reaction, showing that the pseudo-reaction is not due to tuberculin.

The local reaction in other forms of local anaphylaxis is not specific; it shows an uncharacteristic inflammation.

Serum hypersensitiveness is not dependent upon nor inherent in any tissue focus. The tuberculin hypersensitiveness is dependent upon and is intimately bound up with a tuberculous focus; in serum anaphylaxis there are free receptors; in tuberculin hypersensitiveness we must also assume sessile receptors.

Experimental researches in man and in animals have shown that a specific hypersensitiveness to tuberculin cannot be produced by the injection of dead tubercle bacilli nor derivatives of dead bacilli; this can be produced only by the injections of the living organisms. Hamburger was able to induce a transient hypersensitiveness to tuberculin and with this a certain immunity against infection with the living organism; but an immense number of dead tubercle bacilli had to be used (10-20 mg. of bacillary substance—one dose); this dose invariably produced abscesses.

Bail, on the contrary, could produce in animals a hypersensitiveness to tuberculin by the injection of tuberculous tissue. Bail strongly insists that in transferring this tuberculous tissue, no normal tissue should be included. Bail believes that on the epithelioid cells in tubercular tissue the specificity of the tuberculin reaction depends. He believes that the epithelioid cells are the result of irritation produced by the tuberculin of tubercle bacilli and that the tuberculin reaction is due to the interaction of tuberculin and these epithelioid cells.

From the evidence presented we may conclude that repeated injections of tuberculin cannot produce a hypersensitiveness to tuberculin in an individual who is not tuberculous; and conversely that a positive tuberculin reaction signifies the presence of a tuberculous focus in the body.

REPORT OF CASES *

CASE I. F. M.; mother tuberculous; four children died in infancy; fifth, living (3 years), had a positive von Pirquet at 8 months, and is now well; the sixth, the patient came under observation when she was 3 weeks old (weight 9 pounds); birth weight unknown; the infant did perfectly well until the twenty-eighth week, when she had a febrile reaction; the fever lasted ten days; physical examination was entirely negative; the Pirquet reaction was negative at 12, 15, 20 and 23 weeks; at 28 weeks, when the infant developed fever suddenly, the von Pirquet reaction was positive, and has been positive whenever tested since that time; the fever developed suddenly; it was remittent, and came down to nearly normal within ten days; the highest temperature was 103.6° on the fourth day; perspiration was very marked; later followed a period of (100.6-100°) slight fever for seven weeks, during which period the infant was for a number of days entirely afebrile; then there was an exacerbation of fever not unlike the first, which lasted seven days. The infant had slight fever for several weeks following, and then gradually became afebrile. The infant was gaining steadily up to the first febrile reaction; weight at three weeks, 9 pounds; at twenty-five weeks, 14 pounds; at twenty-eight weeks, 14 pounds. The infant did not do well for ten weeks after the onset of the first fever; at thirty-seven weeks she weighed only 12 pounds, 7 ounces; but then gradually began to gain, and at forty-eight weeks weighed 16 pounds, 1 ounce. At the onset of the first fever period, physical examination was entirely negative; within two to three weeks she developed a cough; fine râles localized at level of angle of scapula near the spine could be heard for seventy-four weeks following; D'Espine sign (breath sounds), negative at first, became positive and persisted up to the end of first year. Both the cough and the râles disappeared before the end of the first year; the lesion was probably a small focus in the lung with secondary involvement of the bronchial glands (see Chart, Case I.).

CASE II. A. T., male; mother tuberculous; brother had a positive von Pirquet at seven months, and died of acute intestinal intoxication at fifteen months. The patient came under our observation at nine weeks, weight 8 pounds, 2 ounces; weight at

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* These cases were observed at the milk station connected with the Department of Pediatrics of Vanderbilt Clinic.

fourteen weeks, 10 pounds, 5 ounces; at twenty-four weeks, 14 pounds, 12 ounces. The infant was doing perfectly well up to the age of twenty-four weeks, when he developed a fever which lasted eight days; the fever came on suddenly, was remittent, and came down by lysis to a little above normal; a period of slightly above normal temperature (for four weeks) followed; during this time on several occasions the temperature was normal; at twenty-nine weeks an exacerbation of temperature which lasted eleven days. The von Pirquet reaction was negative at nine, twelve and at nineteen weeks; it was also negative at twenty-four weeks at time of onset of fever, but was positive six days later and thirteen days later. Whenever a reaction was positive it was always repeated the subsequent week, and on other occasions for verification. At onset of first fever, physical examination was entirely negative; three weeks later a cough and a diffuse bronchitis developed; D'Espine sign (breath sounds), negative at first, became positive later; at twenty-nine weeks a cervical adenitis developed; there is some enlargement of the glands up to date (eighteen months).

For twelve weeks after the onset of the first fever the infant did not gain in weight; but later began to gain, and at one year weighed 18 pounds, 6 ounces (see Chart). By the end of the year the cough and the râles disappeared, although D'Espine sign was still positive.

Case III. T. F., female; mother tuberculous; one other child, now two and one-half years old and well, gave a positive Pirquet reaction at seven months; patient came to our milk station at thirteen weeks; weight 7 pounds, 12 ounces. The infant did well for nineteen weeks, weight 12 pounds, 1 ounce; at this time she developed a fever which lasted eleven days; the fever was of sudden onset, high, remittent, and came down by lysis; a slight fever (100-101.4°) persisted for four weeks; during this time there were days of complete absence of fever; at thirty-six days an exacerbation of high fever which lasted eleven days; again a period of low fever for six weeks and another exacerbation of high fever for six days; then the infant gradually defervesced and the temperature came down to normal in three weeks. The von Pirquet reaction was negative at thirteen, twenty-one and at twenty-seven weeks; it was positive at onset of fever, and one week later when it was tested for verification. For fifteen weeks after the onset of fever the child did not gain in weight, but

AGE IN WEEKS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
TEMPERATURE																										
PIRQUET.												−			−					−			−			
Case 1. F.M. lbs.			9	10	10	10	11	11	11	11	11	11		12	12	13	13	13		13		14	14		14	
ozs.			11	1	9	3		7	9	14	14	14		11	12	4	5	8		11		1	10		11	
																								T 8D		
									−			−							−					−	+	+
Case 2. A.T. lbs.									8	8	8	9	10	10	11	11	12	12	13	13		14		14	14	14
ozs.									2	9	15	5		5	5	13	2	11	1	10		9		12	11	10
													−								−					
Case 3. T.F. lbs.													7								9		10	10	10.	11
ozs.													12								8			8	6	3

AGE IN WEEKS	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
TEMPERATURE		T 10D							T 7D																	
PIRQUET.		+	+						+				+					+				+				
Case 1. F.M. lbs.		14	13	13	13	13	12	12	13	12	12	12		13	14	14	14	14			15	16				
ozs.		11	11	3	10	13	15	8	4	13	7	15		9		8	5	12			8	1				
			T 11D																							
			+							+			+							+						
Case 2. A.T. lbs.	14	15				15			15		15	15		16	16	16	16	16	16	17		17		18	18	
ozs.	12					7			7		9	13		2	7	8	11	15	15			9		5	6	
						T 11D				T 13D						T 6D										
	−					+	+			+						+				+						
Case 3. T.F. lbs.	10	11	11	11	12	12	12	12		12	11	11	11	12	12	12	12	11		12		13		13	13	
ozs.	15	4	3	14		1	1	3		1	15	10	9		2		1	13		7		3			15	

later began to gain. During the first febrile period physical examination was entirely negative; later the infant had a diffuse bronchitis with râles over both sides posteriorly, especially numerous near the spinal column. D'Espine sign now positive; at one year the infant still coughed and had râles at right lower lobe posteriorly; at eighteen months neither cough nor râles were present (see Chart).

DISCUSSION OF CASES

The following discussion is based on 9 cases in which the initial fever was studied; 3 of these cases have been previously reported in a paper "On Observations on Milk Station Infants."

In infancy tuberculous infection cannot be differentiated from tuberculous disease; the difference between the two processes is a quantitative one; both these processes imply the formation of tubercles; the pathologic and histologic findings are identical in both; in tuberculous disease the lesions are more extensive and more advanced; in tuberculous infection they are localized and show a tendency to heal rapidly; the former is invariably associated with signs and symptoms; the latter usually runs a latent course (in adults and children); in infants tuberculous infection never runs a latent course; we have never observed tuberculous infection in infants without the occurrence of fever and without the development of signs in the chest; however, in about 30 per cent. of infants who become infected with tuberculosis, the infection remains localized and shows a tendency to heal rapidly. The mere harboring of the tubercle bacillus, either dead or alive, does not constitute either infection or disease; both these terms imply a reaction, on the part of the body, in the form of tubercles. The term tuberculous infection is often misused; it is often used when a latent period of tuberculous disease is meant. "Tuberculous infection" should be restricted to mean the initial infection of the body with the tubercle bacillus, without giving rise to any signs or symptoms. It is our claim that in infancy tuberculous infection occurs *never;* all infants, when they become infected with tuberculosis, have signs and symptoms directly due to the infection; in 70 per cent. of these infants the disease runs a malignant course and leads to a fatal termination; and in 30 per cent. the symptoms are benign and the infants recover.

We are also of the opinion that tuberculous infection in older children and adults may be associated with fever, and that many of the idiopathic fevers may be due to this cause.

The most important symptom of tuberculous infection in infants is the fever; the fever is of sudden onset and may reach 103-104° in the first few days; it is of a remittent type; it lasts eight, eleven to fourteen days and gradually comes down by lysis; but not to normal; these infants thereafter have a low continuous fever, with now and then afebrile periods of a few days; exacerbations of high fever like that of the onset usually occur in the course of the next twelve to twenty weeks; those that recover usually become afebrile in twelve to twenty weeks; in those that do not tuberculous meningitis, or acute miliary tuberculosis, usually develops. In 2 cases, after an apparent state of well-being and while the infants were gaining in weight, signs and symptoms of acute intoxication developed quite suddenly, and the infants were dead from within twenty-four to forty-eight hours after the onset of these symptoms. We wish to call particular attention to this form of death in tuberculous infants; a number of such cases have been recorded in the literature, and several have come to autopsy and showed a general miliary tuberculosis.

Physical examination at time of onset of fever was negative in the 3 cases; however, every one of these cases developed a cough within a few weeks after this initial fever and all had râles on both sides of the chest posteriorly, especially near the vertebral column. D'Espine sign was positive at this time, although it was never present at onset of disease.

From 1909 to 1916 we had the opportunity to observe for shorter or longer periods 23 infants who gave a positive tuberculin reaction. The youngest of these was an infant twelve weeks old with a cervical adenitis; she is now over two years old, and is in perfect health. The first case observed is a boy now over five years of age who had a cervical adenitis at seven months and who gave one of the most marked reactions we had ever seen (this child had all the signs and symptoms of exudative diathesis also, which possibly explains the marked reaction). We have been in the habit for the last few years of performing a Pirquet reaction on every infant who had a febrile reaction without definite cause, and we found that 7 of 49 infants thus tested gave a positive reaction; unfortunately we could not follow up 4 of these cases, but 3 of them later manifested the clinical picture of tuberculous infection; it is apparent that many cases of so-called influenza in infants are really cases of febrile reaction due to tuberculous infection. The protracted convalescence so often seen after supposed influenza is also probably due to tuberculous infection. One point of great importance in the differentiation between these two conditions is the absence of all catarrhal symptoms in tuberculous infection. One should always suspect tuberculous infection in infants who had a fever, without presenting any physical signs, and no catarrhal symptoms, and who later develop cough and signs in the chest.

A study of the weights of 9 tuberculous infants before the onset of the febrile period and before the appearance of a positive tuberculin reaction shows that they correspond very closely with the average weights of 9 healthy infants not so infected. Predisposition seems to play no part in the physical development of infants of tuberculous parents before infection; however, these infants are more apt to become infected on account of their proximity to the source of the infection; if you remove the infant of tuberculous parents (from the parents) before the infant has become infected the infant will do as well as any average infant of healthy parents. Of course, the physical condition of the mother during pregnancy has a great effect on the weight and the strength of her offspring; but such offspring do not necessarily develop tuberculosis if they are removed from the source of infection; however, this is not a rule without exceptions; Mother Nature seems to have a more teleologic end in view; it is not at all a rare occurrence to see an emaciated, tuberculous mother give birth to an 8 to 9 pound infant; the difference in physical appearance between the newborn infant and its tuberculous mother is at times very striking. The heaviest baby we had ever seen was an infant who weighed 30 pounds at eight months, and was then weaned because the mother had a hemorrhage from the lungs; the mother, an amazon, had admitted that she was being treated at the clinic for pulmonary tuberculosis; the von Pirquet of the infant was negative.

We are therefore inclined to believe that tuberculous predisposition does not exist and that scrofula and tuberculous diathesis signify tuberculous disease; judging from autopsy findings in adults, it becomes evident that everybody is predisposed to tuberculosis, for nearly every adult, on autopsy, shows evidence of tuberculous infection.

The average weight of 9 tuberculous infants after infection with tuberculosis is far below that of 9 average healthy infants;

it continues to be below normal (in the cases which recover) for from twelve to twenty weeks, and then they gradually begin to gain; by the end of the second year they weigh nearly as much as the average child of two years. We have found that infants with tuberculous infection do much better on top milk mixtures than on whole milk dilutions.

The tuberculides were observed in only 5 of the 23 cases; they were usually of the papulonecrotic type; in 2 cases patches of erythema (not Bazin's disease) were observed; in one of these there was a wreath-like band around the neck; this area was markedly red and distinctly circumscribed; it was not very much indurated; there was a similar patch beneath the right axilla; both these patches appeared about one week after the initial fever, and disappeared within one week.

The incubation period of tuberculous infection may be estimated from the last time the tuberculin reaction was negative to the time which elapsed when the reaction was first positive; in one of our cases the tuberculin reaction was negative for one week after the onset of initial fever. In two cases this period was five weeks, and in one six weeks. This corresponds to the figures obtained by Koch and Knopfelmacher, who found the incubation period to be about seven (7) weeks.

We are inclined to give a more favorable prognosis of tuberculous infection in infancy than is usually given; 9 of the 23 infants who became infected before one year are alive and well; 10 are known to be dead, and of 4 we do not know the final outcome. Of the 9 living, 1 is over five years, 2 over four years, 1 over two years, and 2 between one and two years. Our actual mortality was 53 per cent., and if we include the 4 cases we could not follow up, among the dead, it would have been 68 per cent., a mortality which is high, but is very low when compared with the usual mortality of from 80 to 100 per cent. stated in the literature.

We are well aware that in infants there is a marked tendency for a rapid and general dissemination of the tuberculous lesions throughout the body and that healed lesions are hardly ever seen in infants dead of tuberculosis; but we cannot assume this to be a fact in all cases. Naturally only the very severe cases come to autopsy, and from our experience we must assume that even in infants the lesions may be localized and heal rapidly and completely. The discussion of whether infants who survive infection in infancy are immune to further infection and if they do become infected whether this secondary infection is due to a recrudescence of the previous lesion or to another infection from without is not within the scope of this paper.

As a rule, the younger the infant is at the time of infection the graver is the prognosis. However, there are a number of recoveries reported in infants under three months; one of our cases was only twelve weeks when she developed a cervical adenitis and gave a positive von Pirquet; this child is now over two years of age and is in perfect health. Frankenau reported a case which gave a positive von Pirquet at thirty-six days, and the child was alive and well at two years, when the report was written. The idea is prevalent that infants under three months do not give a positive von Pirquet reaction. There have been quite a number of cases reported in the literature which controvert this idea. Thus Zarfl obtained a positive reaction in an infant seventeen days, and Grulee in 2 infants respectively at sixteen and nineteen days old (not congenital tuberculosis). The resistance to tuberculous infection is far greater in the first six months of life than in later infancy, and this probably explains the infrequency of a positive reaction in the first three months. The majority of infants in a tuberculous milieu become infected after the fifth month. Four infants of tuberculous mothers who had no febrile reactions never gave a positive reaction (tuberculin), although they were tested on many occasions.

Everywhere one reads that tuberculosis of the mother is an absolute contraindication to nursing; we cannot accept this rule *in toto*. Where nursing is of detriment to the mother it should never be advised, whether the mother is tuberculous or not. While we do not underestimate the value of breast-feeding, we do not exaggerate the dangers of artificial feeding. It is not that we fear artificial feeding, but because we do not find it necessary under certain conditions for a tuberculous mother to wean her infant that we allow it in certain cases. Under these circumstances both the mother and the infant must be considered. If the mother has active pulmonary tuberculosis, or tuberculosis of the breasts, the infant should be weaned at once. If the mother has latent, inactive tuberculosis and her physical condition is good, we see no reason for weaning. Tubercle bacilli are not excreted in the milk unless there is tuberculous involvement of the breasts; and as for the danger of infecting the infant, it is just as great if the infant be breast-fed or hand-fed by the mother. Therefore, we do not wean infants of tuberculous mothers under the conditions stated above, for if such infants become infected from their mothers (and in the majority of our cases we could trace the source of infection to some member of the immediate family), their chances of survival are far greater than they are when artificially fed. It would be ideal, if possible, in every case of a tuberculous mother to take her infant from her and bring it up under the most hygienic surroundings, away from the danger of tuberculous infection, certainly during the period in which tuberculous infection leads to tuberculous disease, and death in a majority of infants so infected.

In the Zeitschrift für Kinderheilkunde (July, 1915) Koch reports observations similar to ours. He observed 2 infants of tuberculous mothers in whom he was able to demonstrate an initial fever and a positive tuberculin reaction as the first signs of a tuberculous infection. The von Pirquet reaction was negative in both cases previous to onset of fever. The first infant gave a positive reaction at nine weeks and died at three and one-half months; the other gave a positive tuberculin reaction at seven weeks and died at five and one-half months. He made a similar observation in a boy four and one-half years old.

The fever was higher in the evenings than in the mornings and varied from day to day. He concludes, from the fact that the fever developed at the same time that the tuberculin reaction became positive, that the fever must be lookd upon as the beginning reaction of the body to tuberculous infection, a conclusion in which we concur and to which we first called attention two years ago.

CONCLUSIONS

(1) The tuberculin reaction is a specific reaction. A positive reaction signifies the presence of a tuberculous focus, either active or latent, somewhere in the body. Normal individuals cannot be sensitized with tuberculin.

(2) In infants tuberculous infection invariably leads to tuberculous disease, either mild or severe. The pathologic basis of tuberculous infection and tuberculous disease is the same in both—both terms imply the formation of tubercles. In the former the lesions are small, localized, and show signs of healing; in the latter the lesions are more extensive and more advanced. In

adults, tuberculous infection may take place without the occurrence of fever or any other signs; in infants tuberculous infection is invariably associated with fever and signs in the chest or abdomen.

(3) All human beings are predisposed to tuberculous infection. Children of tuberculous parents are more apt to be tuberculous because they are more exposed to infection than are other children. Before they become infected, infants of tuberculous parents show the same physical development and the same gain in weight as do average children without tuberculous infection. The importance of segregating infants from tuberculous parents is apparent. Predisposition is easily overcome if exposure to source of infection is avoided.

(4) Fever is the first sign of tuberculous infection in infants. The fever is of sudden onset; at first high (seven to fourteen days), is remittent and gradually comes down by lysis, but not to normal; it continues at slightly above normal, 100-101° for twelve to twenty weeks, with periods of complete absence of fever; exacerbations (two to three) of high fever, of same type as that of onset usually occur.

(5) The tuberculin reaction in these cases usually becomes positive at the onset of fever or within a few days after the onset.

(6) At the onset of the infection no physical signs are present. Within the course of a few weeks (two to three) they all develop signs in the chest, which, in cases which get well, gradually disappear.

(7) The prognosis of tuberculous infection in infancy is more favorable than was formerly supposed; 30 to 35 per cent. of these infants survive the infection.

(8) From these facts we are led to conclude that the pathologic lesions, even in infancy, may be localized and completely healed.

(9) Fourteen per cent. of prolonged febrile conditions in infants diagnosed as influenza give a positive Pirquet reaction. It is possible that many other fevers of obscure origin in infants, children and adults are due to a reaction of the body to tuberculous infection.

(10) The tuberculin reaction should be carried out on every infant who has an idiopathic fever and presents no physical signs.

316 West Ninety-fourth Street.

THE VALUE OF THE LUETIN REACTION IN CONGENITAL SYPHILIS*

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(From the Department of Pediatrics, Long Island College Hospital.)

The isolation of pure cultures of Treponema Pallidum by Noguchi in 1911 led him to the preparation of a sterile emulsion of this organism which he called luetin, and which he demonstrated produced a specific cutaneous reaction when injected into the skin of individuals infected with syphilis.

Dermatologists had already been familiar with the hypersensitiveness of the skin of syphilitics to traumatism; this susceptibility being due to a pathologic condition of the skin itself which Neisser termed "Umstimmung." Noguchi, however, declares that the luetin reaction is more than this, that it is due to an allergic condition. Allergy is a peculiar response of reactivity in the system of individuals infected by a pathogenic organism, this change being produced by the re-introduction of the corresponding antigen, as by the injection of the bacterial extracts or of the bacteria responsible for the disease.

The technique of the test is that as originally described by Noguchi and is as follows:

An equal amount of the luetin and of normal saline are drawn up into a syringe which is graduated into one one-hundredths of a cubic centimeter, and .07 c.c. of the mixture is injected into the epidermis of the arm. The site of injection should previously have been prepared by cleansing with alcohol or an alcoholic solution of bichloride of mercury. Care must be taken that an intradermal injection into the superficial layers of the skin is given and not a subcutaneous one. A successful intradermal injection will produce a white bleb, which increases in size as the fluid is introduced and which subsides in from five to ten minutes. The technique is easily acquired after some practice. It is advisable for those unfamiliar with the reaction to make a control injection of normal saline on the other arm.

A negative reaction may assume one of three forms: (1) normal appearance of the skin without any signs at the site of injection; (2) an area of erythema which disappears in a day or two; (3) a small papule which develops in twenty-four or seventy-two hours and then subsides, leaving, at times, a yellowish pigmentation of the skin. The papule is not surrounded by any area of induration.

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* Read before the Brooklyn Pediatric Society, December 15, 1915.

The positive reaction is also seen in one of three forms:

(1) Papule—A large red indurated papule surrounded by an area of erythema appears within twenty-four to seventy-two hours; this gradually increases in intensity and begins to fade by the seventh day. In some instances a purplish-colored macule persists for a long period.

(2) Pustule—This follows the course of the papular form for about four days, when a depression due to softening of the center is seen and a pustule is formed. In a few days the pustule ruptures and the area becomes covered by a crust, which falls off in a short time.

(3) Torpid form—This variety is not as frequently seen as the other two. It is interpreted as a negative reaction for the first few days, but instead of remaining so, it assumes a papular or pustular form on the seventh or eighth day.

Wishing to test the value of the reaction in congenital syphilis and its significance in children, the writer studied the reaction in the following groups of cases and in the institutions designated:

	Positive	Negative
Polhemus Memorial Clinic—Personal Service—		
Congenital syphilis	18	3
Mongolian idiocy		1
Cretinism		1
Marasmus		1
Furunculosis		1
Meningitis		1
Long Island College Hospital—Service of Dr. E. H. Bartley—		
Congenital syphilis		1
Meningitis		1
Gastroenteritis		1
Brooklyn Home for Consumptives—Service of Dr. L. C. Ager—		
Various forms of tuberculosis	1	22

Williamsburgh Hospital—Service of Dr. J. M. Wallfield—	Negative.
Empyema	1
Cretinism	1

Twenty-one cases of congenital syphilis were observed at the Polhemus Memorial Clinic and one at the Long Island College Hospital. Examination of the blood for the Wassermann reaction were not made upon any of these patients, except as indicated later. The diagnosis of congenital syphilis was made in each case upon the strength of the history, clinical findings and therapeutic tests.

1. F. R., two years old. Syphilitic history on father's side. Mother had 4 children; 2 dead, 1 of enteritis, other probably was syphilitic, as it was of premature birth, had skin eruptions and desquamation of soles and palms. The patient was a full-term child, normal delivery, formula fed, with resulting gastro-enteritis. Very poorly nourished, does not walk, says "mamma" and "papa"; first tooth at fourteen months, sat up at twelve months. At present time has cervical adenitis, adenoids, open fontanels. Luetin test positive—papular form. General reaction on next day shown by increase in temperature and restlessness.

2. W. M., five weeks old. Syphilitic history in family; one other child had similar condition at three weeks of age; maculo-papular rash over body; desquamation of skin on palms and soles. Snuffles; chronic nasal discharge. Luetin test negative.

3. G. O., two and one-half years old. Family history negative. Full-term child, normal delivery, breast-fed. Past history of cervical adenitis, discharging ears, interstitial keratitis since fifteen months old, chronic diarrhea and adenoids. Chronic hoarseness, snuffles present since birth. Von Pirquet test positive. Luetin reaction positive-pustular form.

4. F. M., five years old. Specific history in family. Cervical adenitis. Very anemic and placed on mixed treatment, gaining 7 pounds in one month. Luetin negative.

5. J. D., six years old. Family history negative. Bottle-fed, first tooth at twelve months, walked at eighteen months, talked at eighteen months. Was normal in every respect until one year ago, when he began to stammer, the difficulty in his speech being accompanied by a jerking motion of either arm or of head. Has now double interstitial keratitis, depressed bridge and flat nose.

Diagnosis of congenital syphilis, affecting eyes and central nervous system. Luetin reaction showed marked papule, with a surrounding area of erythema. A month later a purplish-colored area still marked the site of injection.

6. P. O., eleven years old. Mother had two miscarriages in succession; one still-birth. History of snuffles, eruptions in infancy, convulsions at two years old, which produced lameness of the right side three weeks later. Interstitial keratitis. Luetin reaction positive-pustular form.

7. T. C., two years old. Mother and father specific, child underweight, badly nourished. Luetin reaction in five days showed papular form with a beginning pustule.

8. P. C., three years old. Brother of previous case. Luetin test positive—papular form. The mother of these two children also had a luetin test performed, which gave a very decided papular reaction.

9. T. A., five years old. Family history negative. Child was of premature birth, weighed 6 pounds at birth; snuffles and skin rash at three months of age; also history of convulsions, measles, pneumonia, pertussis. Fairly well developed, but a mental defective. Double interstitial keratitis. Two Wassermann tests returned ++++. Luetin test gave a marked papule with area of erythema.

10. G. M., fifteen months old. Family history negative. Premature birth at seven months' gestation. Breast-fed up to five months, when the child had a pneumonia and was then fed on proprietary food. Has rachitic symptoms, such as inability to walk, talk or crawl. Can sit up. Has no teeth. Large head, open fontanels, depressed bridge, flat nose, pot belly, and enlarged liver, occupying almost the entire right side. The body is covered with a specific maculo-papular rash. Luetin test gave a small indefinite papule, the color of which could not be distinguished, as the patient was a negro. The child was placed on mixed treatment and in seven days a decided papule with a surrounding area of induration appeared. This reaction was interpreted as one of the torpid variety.

11. E. W., two years old. Father claims he never had venereal disease. Mother has been deaf in both ears for the past ten years. Has one sister, who is apparently normal. Mother has 4 children, 2 of whom have rickets, youngest one

normal. All were brought up on formulas. Patient is third child; teething began at thirteen months, when she first sat up; crawls, but does not walk or talk. Shows signs of rickets, as anterior fontanel open, sweating about forehead, rosary and underdevelopment. Luetin tests gave a distinct red papule, which remained for three weeks.

12. V. W., twenty-five years old. A luetin test was then performed on the mother and a papular reaction obtained. The mother was told the meaning of both these results. She denied that she had ever had any syphilitic symptoms. She returned in a week, however, with a letter from her family physician, in which he stated that her mother had had a syphilitic infection, for which he had treated her, and that she had died as a result of this condition.

13. G. W., three and one-half years old. Sister of S. W. (daughter of Case 12). Congenital syphilis of third generation. Was in the Long Island College Hospital for an orthopedic condition resulting from rickets. Luetin test was negative in this case.

14. R. V., 35 days old. Mother syphilitic, giving a positive reaction to both Wassermann and luetin tests. Normal delivery, breast-fed, conjunctivitis since five days old, snuffles, bloody nasal discharge, both fontanels open, fairly well developed. Luetin test negative.

15, G. S., twelve months old. Syphilitic history in both parents. Full-term child, normal delivery, badly nourished, defective teeth, hydrocephalus. Luetin test positive—papular form.

16, 17, 18. These 3 cases, of 2 brothers and a sister, aged six, eleven and nine years respectively, were brought to the clinic because of a general family mental deficiency. They were all physically well developed. Luetin test was performed on each one, a control injection also being given. The luetin in each case gave a positive reaction of the papular form with indurated borders. The children were given mixed treatment, this causing an increase in the size of the papule and in the intensity of the reaction. The control in each case was negative. Investigation of the family history resulted in the discovery of paresis in the father, who confessed to a youthful venereal infection. His blood examination gave a positive Wassermann. These 3 cases were reported in full before this Society and published in the Long Island Medical Journal for June, 1914.

19. C. P., eleven years old. Specific history in family. Father also tubercular. Child is a mental defective. Past history negative, except that he was never normal mentally. Luetin test positive, of papular form. Von Pirquet test also positive.

20. H. P., fourteen years old. Brother of the above and also a mental defective. These two are the only children in the family. Luetin test positive—intense papule with erythema. Von Pirquet also positive.

21. F. H., five years old. Father died at thirty-three of apoplexy (?). Alcoholic history present in his father and grandfather; he, however, never drank. Patient was full-term child, instrumental delivery; first tooth at six months, first spoke at two years, walked at two years. Did not progress in development and never appeared normal to mother. Breast-fed for eighteen months. Brought to the clinic for general backwardness. Well-developed child, adenoid facies, staggering gait, slow at obeying commands, talks very slowly and with great effort in low, mumbling tone. Is a mental defective. Luetin test positive—papular form.

22. W. H., three and one-half years old. Brother of previous case. Normal delivery, full term, breast-fed for eighteen months. No other children in family, but these two. No miscarriages. First tooth at twelve months, teething slowly and not complete yet. Sat up at eighteen months, walked at two years. Mother first noticed that child was not normal when he was about two months old. Luetin test at first appeared negative, but on fifth day lighted up as a distinct papule, thus placing this in the torpid form. With these findings, pointing to congenital syphilis, the mother was questioned as to any specific history. The death of the father at the age of thirty-three from so-called apoplexy was suspicious. In addition to this, the children improved on mixed treatment. The mother denied all knowledge of any venereal condition, but, after an interval of several months, she finally confessed that she had been raped when she was sixteen years old and that she had been pronounced syphilitic prior to her marriage.

Upon analyzing these 22 cases of congenital syphilis, we find that 18, or 81 per cent., gave a positive reaction. Alan Brown injected 33 cases of congenital syphilis at the Babies' Hospital in New York and obtained 30 positive reactions, or 90 per cent.

Noguchi, reporting the findings of 50 investigators in all varieties of syphilis, gives 70 per cent. as the average for positive reactions in the hereditary type.

The relative frequency of the three forms of the positive reaction in my series are: papular, 13; pustular, 3; torpid, 2. This differs from Alan Brown's findings, for he did not observe any of the torpid form in his series, 15 of the reactions being papular and 15 pustular.

I did not obtain any positive results in children under six months of age, the minimum age limit for the positive reaction being twelve months. Other observers, however, have obtained positive tests, even in the first month.

Of particular interest are the 2 cases of congenital syphilis of the third generation. I cannot explain why one of the children should give a positive reaction and the other a negative. The mother of the two, with a congenital syphilis of twenty-five years' duration, also gave a positive reaction. These are probably the first instances of their kind in the literature on luetin.

Eight of the positive cases were mental defectives, according to a modified Binet test. This emphasizes the contention of numerous clinicians that congenital syphilis should be considered as an important etiologic factor in cases of imbecility and mental delinquency.

The test was also performed on twenty-three non-syphilitic children at the Brooklyn Home for Consumptives. All of these children were infected with tuberculosis in some form. It was very difficult to obtain any reliable family history as to syphilitic infections. Both a luetin test and a control of normal saline were made in each case. All gave negative reactions to the luetin except one, in which a papule was observed on the fourth day, which became a pronounced pustule in a week. Upon investigation it was discovered that the father of the child was a drunkard, who had deserted his wife. The probability of his being syphilitic should not be overlooked.

A detailed study of the remaining 22 cases demonstrates the advisability of performing a control injection as an aid to a correct interpretation of the luetin reaction. In 14 cases both the luetin and the control gave negative results. In 8 cases a reaction was obtained to both the luetin and control. In 2 the luetin produced an erythema, and in 6 a papule which subsided within forty-eight hours. These reactions were considered negative. The reactions to the control injections indicate that the condition of "Umstimmung" may occur in tuberculosis as well as in syphilis. Noguchi suggested the possibility of this pathologic condition of the skin being present in diseases other than syphilis.

CONCLUSION

The results obtained in this series are in accord with those obtained by other investigators as to the reliability of the luetin reaction in congenital syphilis. The reaction was present in 81 per cent. of the cases of congenital syphilis and was absent in all non-syphilitic cases but one.

This test is more adapted for pediatric work than the Wassermann. It is especially more so in dispensary work, where it sometimes is almost impossible to obtain permission from the parents to draw blood from a child. The cases cited above amply demonstrate that it is especially valuable in those cases where all knowledge of any venereal infection is denied, or even where it was never suspected.

Familiarity with the technique of the test and the interpretations of the reaction is easily acquired, and made available for every practitioner for clinic or office use. The Wassermann reaction, however, requires an elaborate equipment and a special course of training.

In all the reports on the application of the luetin reaction, not a single case has been reported in which syphilitic infection was carried into the system. This stamps the emulsion as sterile and the test as absolutely safe. As a rule, no general constitutional disturbances are produced.

I wish to take this opportunity of extending my gratitude and thanks to Dr. Hideyo Noguchi, of the Rockefeller Institute, for supplying me with necessary emulsion and for his aid in familiarizing me with the technique and the reaction. I also wish to thank Dr. Elias H. Bartley and Dr. Louis C. Ager for permission to carry out my investigations on their services.

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SYMPTOMATOLOGY OF CONGENITAL INTESTINAL OBSTRUCTIONS

BY FRANK VAN DER BOGERT, M.D.

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Within the past five years there have come under my care 3 babies suffering from congenital obstructions of the small intestines, and all eventually dying from this cause, the condition in each case being confirmed by autopsy.

The first, reported in the August, 1911, number of the ARCHIVES OF PEDIATRICS, was a baby of two months, with a very marked obstruction, though not a complete atresia, of the ileum, situated at a point 23 inches above the ileocecal valve. The ileum above was markedly dilated, but the section below the obstruction not apparently atrophied, water could be forced through the obstructed lumen.

The second, seen first when four months old, on autopsy sixteen days later, showed an obstruction, not complete, of the duodenum, situated 2½ inches from the pylorus and apparently due to constriction by an adhesion. The duodenum above was markedly though not greatly dilated.

The third, thirty-six hours old when seen, and dying on the same day after an attempt to relieve the condition by operation, showed, at autopsy, atresia of the gut at a point 39 inches from the pylorus. The intestine above was greatly distended. At the point of obstruction the bowel narrowed into a simple fibrous cord, and below, for a distance of 43½ inches to the ileocecal valve, the caliber was apparently decidedly subnormal. The colon was small. Below the obstruction the ileum was found to be constricted at several points, all patulous except one, situated 1 inch below the area of atresia. Through this point water injected would not pass.

This multiplicity of the lesions is of interest in view of a case recently reported by Drennan and Clark in the November number of the American Journal of Diseases of Children. In their case the hopelessness of operation was demonstrated by the scattered arrangement of the areas of complete obstruction and the high position of the first. In my case, operation, if performed early enough, might have been of some benefit, because of the much lower position of the original lesion and the proximity of the only two points of complete obstruction.

In the first case, had a diagnosis been made early, a cure might have been very readily obtained, since the lesion was single and only 23 inches above the ileocecal valve.

A study of the 3 cases has brought out several rather interesting points in the symptomatology of these conditions.

Vomiting was naturally present in all. In the first case there was a history of "simple regurgitation of milk in its natural state" prior to the third week of life. After three weeks there was vomiting of "brown milk," but no vomiting of medicines. The baby was not seen at this time, so no analysis of the vomitus was made. When seen at two months, fecal vomiting had occurred, and because of the incompleteness of the obstruction an unusual combination of symptoms, fecal vomiting and free evacuation of the bowels occurred.

Case 2, where the obstruction was only 2½ inches from the pylorus, was of special interest in differentiation from congenital pyloric obstruction. There was no appearance of bile in the vomitus, though unfortunately no chemical tests were made. The vomiting occurred late, however, and was not constant. He did not vomit during the three weeks on the breast. The obstruction was not complete.

Case 3 vomited mucus immediately after birth. Early in the first day he vomited green material, and at twenty hours meconium began to show in the vomitus.

Stools—In Case 1 there was constipation, but a small, plain enema gave a fairly good result. Later, free evacuations were obtained by high enema.

In Case 2, in the early weeks, when on the breast, the bowels were said to be loose, later constipated and movements very small.

Case 3 showed a stool which might be of great value as a diagnostic sign. The passage was described by the physician in attendance as a piece of cheesy material a few inches long and about the caliber of a lead pencil, white or very light yellow in color and about the consistency and appearance of cottage cheese. Similar masses were found in the colon at autopsy and apparently consisted of epithelium thrown off by the mucous membrane with none of the other normal constituents of meconium.

Abdominal Symptoms—Case 1, showed marked abdominal distention; the abdominal wall was thin and the coils of intestines showed prominently. Reverse peristalsis was noted but once.

I have no notes of any abdominal symptoms in Case 2. Gastric peristalsis was looked for but not definitely noted.

The small amount of abdominal distention in Case 3 was called to my attention during examination by the operating surgeon as evidence against any marked degree of obstruction. During palpation, however, it was found that gas was expelled by the mouth when marked pressure was made upon the abdomen. This apparently showed the reason for so slight a degree of distention present, with complete atresia of the bowel. In this connection it might be interesting to recall a case seen in consultation a short time previously.

According to the parents, a very young baby had been given so much salt solution by enema that it came out of the mouth. This seemed absurd at the time, but in the light of the present occurrence and since it has been shown that bismuth enema at times may run well up into the ileum, it seems more possible.

The stomach in Case 3 was not enlarged. I have no notes of the size of the stomach in the other cases.

111 Union Street.

POSTOPERATIVE ANTISEPTIC TREATMENT OF THE TONSILLAR FOSSÆ—To prevent postoperative reaction along the pillars, in the fauces, and occasional edema of the uvula, with great soreness in the throat, difficulty in swallowing, and impaired speech and a heavy fibrous exudate in the tonsillar fossæ, G. P. Marquis (Jour. A. M. A., 1915, p. 160) has ready a tampon about the size of the tonsil, and saturated with alcohol. Immediately on removal of the tonsil, this replaces it in the fossa and prevents the hemorrhage. When it does not, the pillar is retracted and the bleeding point grasped with a hemostat. The fossa is then painted with 25 per cent. iodine solution, which is also carried onto the pillars and uvula. As a rule, there is almost no soreness the next day, but when any is present the same solution is applied. He has treated over 100 cases in this manner, and in only one case has it seemed to have no effect.—*The American Journal of Obstetrics.*

A CONTRIBUTION TO THE DIAGNOSIS OF APPENDICITIS IN CHILDHOOD

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Appendicitis is largely a disease of early life; about 3 per cent. of the school children that come to the dispensary, present symptoms that make this diagnosis certain or highly probable. It is also likely that most cases of adult appendicitis had their foundations laid in childhood. Furthermore, appendicitis in school children is, from the nature of things, more apt to be acute and prone to dangerous developments; it is therefore desirable that we should be in position to avail ourselves of every diagnostic criterion within our reach.

In earliest childhood, the diagnosis of appendicitis is exceedingly difficult, especially its differentiation from the obstructive types of intestinal disease. At this age there is little prospect that the diagnostician will have his task made easier, since the little patient cannot help us by giving particulars of his subjective sensations.

At the school age, matters are somewhat better, as the child can, to a certain extent, localize abdominal pain. We are more likely to obtain a fairly good anamnesis as to constipation or diarrhea. The patient can relax his abdominal muscles, so that localized rigidity in the right lower quadrant can be elicited; this is practically impossible in a crying or highly excited young child. In many cases, there is no special difficulty in determining a head zone, or tenderness at McBurney's point, or noting Rovsing's, Blumberg's or Meltzer's signs; it is, however, safe to say that in about one-third of our suspicious cases we are left in doubt, as none of the above phenomena is unequivocally present.

We may pass on to the most often neglected diagnostic procedure, the examination per rectum. This affords special advantages in children, as the examining finger is able to reach relatively high levels, so that, particularly in small children, we may palpate the appendicular region without difficulty. In the event of the formation of an abscess or a peritoneal effusion, we can readily detect a protrusion or bogginess from below; on the other hand, many severe types of appendicitis are negative in this regard; furthermore, I have known good clinicians to claim that they felt something, when the case turned out not to be appendicitis at all, but a lobar pneumonia or other acute infection. In my experience, the value of this phenomenon does not go beyond certain limitations; we should avail ourselves of it only with strict reservations, and form a decision only on unquestionably positive findings.

There is, however, a valuable aid in the subjective sensations, available in intelligent children. High palpation of the right iliac fossa, per rectum, elicits tenderness and pain in the McBurney region when appendicitis is present, never under normal conditions. To determine this point to our satisfaction, it is necessary to observe certain precautions. In the first place, we must gain the confidence of the little patient, assuring him that the procedure will not be distressing. Secondly, we must introduce the examining finger quite painlessly; this can always be done if we exercise patience; the ordinary rectal examination is far too often conducted brutally, causing the patient considerable pain and alarm. It is evident that no clear statement can be obtained from a child whose sphincter has been violently dilated. With free lubrication and slow dilatation, this procedure can be rendered absolutely painless, even at the age of six or seven years.

The valuable diagnostic point consists in the fact that the patient complains of no discomfort, until the introduced finger reaches the right iliac fossa, when the child complains of a sharp pain in the neighborhood of McBurney's point. To assure ourselves that the pain is in no relation to the mere rectal examination, we must ask the child to point out the site of the pain; if due to a rough introduction of the finger, the patient will invariably point to the anus, if appendicular, it will always be correctly localized, provided the intelligence of the child is adequate, as I have usually found it to be after the age of eight years, and often much earlier. In conjunction with a history of intermittent constipation, the presence of a slight rise in temperature, and complaints of pain in the right lower quadrant of the abdomen, I regard it as the most valuable sign of appendicitis, whenever it can be elicited.

In the event of a negative finding, we should not rule out this disease, unless we can assure ourselves that the patient has cooperated intelligently; this point must be determined by our psychological judgment of the individual's mental capacity, and is of course subject to a certain chance of error, until our experience becomes equal to an accurate decision; it follows that this diagnostic method is apt to vary in its usefulness, according to the personality and experience of the examiner. Some practitioners are remiss in too frequently omitting the examination per rectum altogether; this constitutes an error in procedure as a matter of principle, and in children, in particular, deprives the clinician of an especially valuable aid in diagnosis. Carried out rudely, its value is no doubt to a certain extent impaired; performed *lege artis,* its usefulness cannot be exaggerated, as I have tried to point out in connection with the subject in hand.

111 West Eighty-fifth Street.

RÖNTGEN-RAY EXAMINATION OF THE LARGE INTESTINE IN INFANTS AND CHILDREN—Ignaz Péteri (Jahrb. f. Kinderheil., August, 1915) discusses the value of the X-rays in the diagnosis and examination of the large intestines in children. He believes that much light can be thrown on the topography and function of this organ by means of the X-rays. Since bismuth in large amount has been found harmful to infants, other materials have been tried for the purpose of rendering the intestines visible by the rays. The author uses thorium. In order to make the thorium enter the large intestine a large amount must be fed to the child, which it is difficult to make him swallow. The author introduces it by rectum. He uses bismuth subnitrate and carbonate, zirconium oxy-anhydride, with thorium oxy-anhydride, and barium sulphate suspended in a liquid. The colon must be entirely filled and the fluid retained in place by an obturator while the rays are being used. In spastic obstipation the colon is sure to be contracted. The rays assist in making a diagnosis of the form and location of abnormalities of the intestine, dilatation, and diaphragmatic hernias. It shows numerous normal variations in the conformation of the colon. It also gives the opportunity of observing the function of the colon, the peristalsis, antiperistalsis, and other muscular contractions of the bowel. There are three sorts of movements of the colon—small movements, which bring about mixing of the contents; retrograde movements, and gross movements, which cause the feces to pass rapidly down the intestine. The author's observations deal with twenty-eight children. —*The American Journal of Obstetrics.*

THE NURSERY UNIT

BY F. ELMER JOHNSON, M.D.

New York City

Assistant Visiting Pediatrist, Volunteer Hospital. Visiting Pediatrist, New York Polyclinic Hospital Clinic; Assistant Physician, Babies' Hospital Dispensary.

It has been my good fortune for the past two years to observe a very interesting experiment directed toward the saving of foundling and surrendered babies. I have called it "The Nursery Unit."

Mrs. Harry S. Bowen of New York City, in 1913, conceived the idea of founding a nursery for the care of these babies. She desired to give them the best possible surroundings and care, until they could be placed in homes of adoption. An apartment on the twelfth floor of a modern apartment house in the Washington Heights section was chosen. The proper estimate of air space allowed for the care of six children. Two rooms were used, one for day, the other for night, thus assuring thorough ventilation. During the summer, the roof was used for a daily airing. Every detail of modern infant feeding was carried out by a trained nurse under the direction of a physician.

Babies when first admitted are isolated for several days before entering the nursery rooms; and if an infection develops in the nursery, isolation is enforced.

After eighteen months in the apartment, the nursery was moved to a house in the Riverdale section of the Bronx. The house is quite apart from others and at considerable elevation. Here it is possible to admit seven or eight babies at a time and keep them in the open air from 9 A.M. until 5 P.M. While the babies are out-of-doors, the nursery-rooms are carefully ventilated.

Every effort is made to prevent that condition which is difficult to describe, but which every one associated with institutions recognizes as "Hospitalization." The babies are taken up by the nurses, allowed to kick and creep on the floor and play with toys. The atmosphere of the home pervades.

During the past two years the nursery has been conducted continuously, except for four months in the summer of 1914. Forty-six babies were admitted during this time. All of these except one were under nine months of age and thirty were under three months. The average weight upon admission of the twenty-two under one month of age was six and one-half pounds and of the four two-months old, six pounds and thirteen ounces. One baby nearly nine months old weighed nine and one-half pounds upon admission. These statistics suffice to show that the babies brought to the nursery were far below the average in nutrition. None of these babies received breast milk during their stay.

The results of these two years' work have been very encouraging. By adoption, twenty-nine have been placed in permanent homes. Eight are now ready for adoption. Five have been claimed by parents or guardians. Four have died. Of these, two died in homes of adoption. Of the two who died in the nursery, one showed at autopsy pyonephritis and the other an enlarged thymus, weighing 27 grams. Just before death, the latter showed symptoms of thymus suffocation. The average stay in the nursery was sixty-one days. The average gain of those who lived was five ounces a week.

The direction of our thoughts should now be brought to bear on the great problem of the foundling and surrendered babies in our institutions. Van Ingen by an investigation of the institutions in New York City for the care of foundlings and surrendered children, found that the mortality under one year of age was 51.6 per cent. of those born in, or admitted to hospitals. Many of those babies had the benefit of breast milk from their mothers or wet-nurses. Further, in eleven institutions in New York State from 1909 to 1913, of 28,210 children under two years of age, 11,918 died. This is a death rate of 422.5 per 1,000, or five times the mortality of the state as a whole. Every physician, social worker and philanthropist should be alive to the gravity of this situation.

Anyone who has had the opportunity of seeing children housed closely together knows the bad results. The nearest approach to the ideal would be an individual home for each baby, but this seems out of the range of possibility. "The Nursery Unit" is offered as the more practical solution.

203 West Eighty-first Street.

MISCELLANY

ADDRESS TO THE PHILADELPHIA PEDIATRIC SOCIETY

BY W. N. BRADLEY, M.D., RETIRING PRESIDENT

As I leave this chair at the close of my second year as your presiding officer, I am conscious of many regrets. The years just ended, with their happy associations and the cementing of friendships, have been characterized by an interest, activity and harmony which could not fail to be a source of inspiration to all who participated.

Two years ago, when I assumed the responsibility of this office, in considering how the Philadelphia Pediatric Society could best fulfil its function, a three-fold plan suggested itself—

First, to make our meetings valuable by presenting the highest standard of scientific papers.

Second, to acquaint the physicians of Philadelphia with the work done by the foremost pediatrists in other cities.

Third, to encourage research and scientific work among our own members.

That we have not failed in the realization of this aim is most eloquently attested by the gratifying attendance at our meetings.

For the measure of success which we have attained, all credit is due your able Board of Directors and efficient committees. For their untiring efforts and unselfish devotion to the interests of the Society I cannot eulogize them too highly. Especially would I commend the Membership Committee, for during the past year our membership has been increased to the extent of forty-seven. Our Secretary and Treasurer also have rendered efficient and devoted service, for which I wish to express my sincere appreciation.

I need hardly say how great a privilege it has been to hold this seat of honor, and the work and responsibilities which it has entailed have given me the keenest joy. And so for the honor and the work I have been deeply grateful.

The programmes for the past year have been characterized by the same standard of excellence as those of the preceding year, but a review of those programmes would only consume valuable time, which I think can be used to better advantage.

I referred a moment ago to our successful meetings, the average attendance of which has been ninety for the past two years. While this number seems large, it is very much to be regretted that in a community such as Philadelphia, with 3,500 physicians, a large majority of whom are general practitioners, so small a percentage evince any interest in our meetings.

Every general practitioner is a pediatrist in a comprehensive sense of the term, for every general practitioner regards children as his legitimate patients. His responsibility then to those patients demands that he lose no opportunity to acquire all knowledge and skill possible in dealing with the diseases and problems of child life.

In considering this disinclination of the general practitioner to evince more than a passing interest in pediatrics, one cannot fail to be impressed also by the few physicians who devote themselves to this branch of medicine. There ought to be more, a great many more, and there will be when the importance of the subject is fully realized and acknowledged.

In looking for the explanation for this lack of interest, it has been forced upon me that the pediatrists themselves are very largely responsible.

It is perfectly natural that the medical student, hospital interne and dispensary assistant should each depend for his inspiration upon the professors and instructors in college and upon his hospital and dispensary chiefs. *Where* these are imbued with a spirit of absolute devotion to their work, and are possessed of the enthusiasm and vision to make the beginner see its attractiveness and possibilities, there is no dearth of younger men willing and anxious to devote themselves to this line of work. By way of illustration, I have in mind a hospital to which the visiting gynecologist is a man of such ability and enthusiasm that he unconsciously inspires every interne who goes out from that institution with a determination to devote himself to gynecology. This brings the matter home to all of us. How absorbing and sincere is our interest in *our* work? Is it merely a means to financial gain, or is it so deeply and sincerely a part of our lives that we are eager to devote to it the best that is in us?

Perhaps our vision is too narrow. Perhaps we have failed to realize that the work of the pediatrist does not begin and end with the treatment of the sick child. It is an infinitely finer thing to keep that child from becoming ill. This thought suggests the bigger, broader side of our subject—the humanitarian side.

This aspect of pediatrics opens out such a splendid vista of possibilities that the horizon seems unbounded by anything save the physician's time and strength. The opportunities are infinite and the attainments should be glorious. Where can we find a more thrilling and inspiring appeal for devoted service in the whole realm of medicine!

It would seem that the logical time to instill in the physician these broader ideals would be during the period of his medical training. If the medical school recognizes only that side of pediatrics relating to disease, it is inevitable that some physicians will go through life without ever awakening to the finer responsibilities of their profession.

In pursuance of this thought, I would suggest that it would be entirely within the province of the Pediatric Society to recommend that there be included in the course of pediatrics of the various medical colleges certain important subjects, viz:

The problem of the abnormal child.

Heredity, with especial reference to alcoholism and syphilis.

Tuberculosis.

Prenatal care.

Special care of premature and feeble infants.

The importance of breast-feeding.

The agencies for infant care and child welfare, and their relationship to preventive medicine.

As I lay down this gavel it is but natural that my mind and heart turn to the future of the Society with an earnest wish for greater progress and a striving for higher ideals. Surely our work is not ended with the attainment of successful meetings! While this is vital to the life of the Society, it is but a limited part of the work which is within its province; and while the presentation of scientific papers is a very important part of the work of a pediatric society, its scope and usefulness would be limited indeed if confined to such a policy.

The success of any activity depends upon its progressiveness, and the progress of this Society depends upon our activity in broader fields for service.

Favill[1] has pointed out where *our* fields of future usefulness and greatest activity lie. In commenting upon the recent progress made by the sociologists, he says: "As they have gone on outlining this territory they have markedly educated the medical profession. As they progress, however, they find themselves at every turn confronted by the necessity for *expert scientific advice.* That their need in this direction shall be met by free, full and cordial contribution from the profession is earnestly to be hoped."

Dr. Hamill,[2] in a recent address, has given expression to the same thought when he states that the problems of the pediatrist and the sociologist are inseparable: "All public health problems have a pediatric basis, and in their solution the pediatrist should be a potent factor. Fundamentally they are medical problems, and neither the philanthropist nor the sociologist is competent to cope with them."

If we are to meet this appeal for *expert scientific advice,* it is imperative that we take up at once the study of those problems as yet unsolved. These are numerous, but the limited time at my disposal permits mention of but two or three:

As the first of these, I would consider the child in the institution. It has been definitely proven that the infant mortality rate has been greatly diminished by the boarding-out system as compared with that of asylums and institutions, and while the latter may always be to some extent a necessity, efforts should be made to minimize to the smallest degree the number of children cared for in this unnatural manner. This end could be attained in a number of ways, viz:

Adequate provision should be made for every destitute mother, so that she could keep her baby with her, whether it be legitimate or not, and nourish it.

If the baby be an orphan, it should be placed in a properly-supervised private home, and wet-nursed if possible, provision being made for Wassermann test for both foster mother and child.

Older children should be boarded out in the country in private homes inspected at frequent intervals, where their physical and mental development could be intelligently supervised.

All institutions receiving and placing out children should be equipped with adequate hospital facilities and properly qualified medical staffs, so that any child becoming ill could be returned to that institution for medical care.

It is perfectly obvious that where large groups of children are housed together, there is grave danger from the spread of infectious and contagious diseases. Managers of all such institutions should be required to so provide for the health and comfort of the children under their care that they are protected from disease and its evil consequences by all preventive measures known to medical science.

Any group of persons which undertakes the care of children is morally responsible to the extent of giving such care as is approved by our present-day knowledge, and the number of children should be limited by law to the number which can be cared for in accordance with this principle.

During the past year surveys have been made both of day nurseries and baby farms by members of this Society acting as individuals, which have had far-reaching effects. One result has been the enaction of laws by the Board of Health for the conduct and control of boarding places for babies. If one public-spirited individual can effect such important and needed legislation, what opportunities are presented to a Society like ours for similar service!

There is no one subject which offers larger possibilities for study than that of the abnormal child, both because of its importance and because of the fact that so little attention has been given it by *pediatrists*. It is fundamentally a medical question, and yet its solution has been largely left in the hands of sociologists and lay organizations. It is appalling to note how very many such cases exist. In a recent survey of school children in New Hampshire[3] the fact was disclosed that 43 per cent. were either feeble-minded or in varying degrees of retardation. "Many of these feeble-minded children are members of notoriously degenerate families that have intermarried and procreated and are filling schools and institutions with their unsocial offspring." It is perfectly evident that this condition can never be remedied until we have State control, protection and care of the feeble-minded with the ultimate aim of eliminating this defective class.

The figures which concern us most, however, are those of our own city. In 1910[4] the Department of Public Health and Charities made the following statement:

"Philadelphia, with 1,500,000 population, contains very probably 3,000 cases of feeble-minded and 8,000 others so deficient that a statement of their mentality depends principally on the viewpoint of the examiner."

We are very prone to lose sight of the fearful results of feeble-mindedness, and this may account for our inaction in the past. Of chief social importance among these may be mentioned social unfitness, destitution, immorality, illegitimacy, disease and crime.

In a recent investigation made in Philadelphia by Dr. Cornell[5] it was shown that of the disciplinary cases in a Philadelphia special public school only 3 per cent. were of normal mentality for their age, and of the delinquent children in the Philadelphia House of Detention only 5 per cent. were of normal intelligence, which discloses the close association of mental deficiency and delinquency.

It is not my intention to enter into a discussion of the various forms of feeble-mindedness or delinquency, but merely to take occasion to point out the necessity for early recognition, classification and disposition of each. This task falls in the hands of the pediatrist, and the responsibility is no small one.

It would seem expedient that the State should provide adequate mental examination carried on through the medium of the public schools. Some form of test to disclose any deviation from the normal could be made by a visiting clinical psychologist.

The study of such problems as I have suggested this evening belong as much to the field of research as any laboratory investigation. While the matter of research has frequently been urged upon you by retiring Presidents, I am making the appeal for research, giving the term its broader meaning of investigation, examination and inquiry into allied child welfare problems.

Favill,[1] in a recent article, states that the most serious indictment of medical practice to-day is that it is superficial.

"That which makes the mass of physician's problems insignificant is that they are dealt with insignificantly."

"There is no so-called minor ailment which has not a major reasoning within it, and the test of a physician's ability will be his capacity to discern ultimate facts and, so far as may be, readjust conditions."

"The more thoroughly human affairs are investigated the more underlying causes for social conditions are discerned. The deeper becomes a knowledge of social pathology the more manifest it becomes that mental, moral and physical values in human affairs are ultimately questions of *health*."

"Too much credit cannot be given to those patient seekers after truth. Year after year, decade after decade they are delving into the obscurity of life phenomena and encouraged by every detail of discovery are undaunted by floods of disappointment arising from inherent difficulties in their task. Medical science knows no country, no creed, no politics, and, in general, no personal advantage. The underlying motive is truth, which may be applied to the benefit of mankind."

There is a poem which I think expresses more beautifully than anything I have ever read the depth of sacrifice and suffering and the joy in attainment of exploration, and, translated to the realm of medicine, of research. And because I think it holds an inspiration for all of us and makes a more thrilling appeal than I could make for conscientious, more disinterested, truer and finer work, I am going to impose upon your patience for just a few moments to quote for you a part of Kipling's "Explorer":

"There's no sense in going further—it's the edge of cultivation,"
  So they said, and I believed it—broke my land and sowed my crop—
Built my barns and strung my fences in the little border station
  Tucked away below the foothills where the trails run out and stop.

Till a voice, as bad as Conscience, rang interminable changes
  On one everlasting Whisper day and night repeated—so:
"Something hidden. Go and find it. Go and look behind the Ranges—
  "Something lost behind the Ranges. Lost and waiting for you. Go!"

So I went, worn out of patience; 'never told my nearest neighbours—
  Stole away with pack and ponies—left 'em drinking in the town;
And the faith that moveth mountains didn't seem to help my labors
  As I faced the sheer main-ranges, whipping up and leading down.

March by march I puzzled through 'em, turning flanks and dodging shoulders,
  Hurried on in hope of water, headed back for lack of grass;
Till I camped above the tree-line—drifted snow and naked boulders—
  Felt free air astir to windward—knew I'd stumbled on the Pass.

'Thought to name it for the finder: but that night the Norther found me—
  Froze and killed the plains-bred ponies: so I called the camp Despair
(It's the Railway Gap to-day, though). Then my Whisper waked to hound me:—
  "Something lost behind the Ranges. Over yonder. Go you there!"

Then I knew, the while I doubted—knew His Hand was certain o'er me.
  Still—it might be self-delusion—scores of better men had died—
I could reach the township living, but . . . He knows what terrors tore me . . .
  But I didn't . . . but I didn't. I went down the other side.

Till the snow ran out in flowers, and the flowers turned to aloes,
And the aloes sprung to thickets and a brimming stream ran by;
But the thickets dwined to thorn-scrub, and the water drained to shallows—
And I dropped again on desert, blasted earth, and blasting sky. . . .

I remember lighting fires; I remember sitting by them;
I remember seeing faces, hearing voices through the smoke;
I remember they were fancy—for I threw a stone to try 'em.
"Something lost behind the Ranges," was the only word they spoke.

I remember going crazy. I remember that I knew it
When I heard myself hallooing to the funny folk I saw.
Very full of dreams that desert: but my two legs took me through it . . .
And I used to watch 'em moving, with the toes all black and raw.

But at last the country altered—White man's country past disputing—
Rolling grass and open timber, with a hint of hills behind—
There I found me food and water, and I lay a week recruiting,
Got my strength back, lost my nightmares. Then I entered on my find.

Well I know who'll take the credit—all the clever chaps that followed—
Came, a dozen men together—never knew my desert fears;
Tracked me by the camps I'd quitted, used the water holes I'd hollowed.
They'll go back and do the talking. They'll be called the Pioneers!

Have I named one single river? Have I claimed one single acre?
Have I kept one single nugget—(barring samples)? No, not I.
Because my price was paid me ten times over by my Maker.
But you wouldn't understand it. You go up and occupy.

Yes, your "Never-never country"—yes, your "edge of cultivation"
And "no sense in going further"—till I crossed the range to see.
God forgive me! No, *I* didn't. It's God's present to our nation.
Anybody might have found it but—His Whisper came to Me!

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SOCIETY REPORTS

THE NEW YORK ACADEMY OF MEDICINE—SECTION ON PEDIATRICS

Stated Meeting, Held January 13, 1916

ROYAL STORRS HAYNES, M.D., IN THE CHAIR

PROGRESS IN THE TREATMENT OF INTESTINAL PARASITES

DR. SARA WELT-KAKELS presented 2 patients with hookworm disease, a boy of eleven and a girl of ten, and gave a microscopic demonstration of the organism. These children were from the West Indies and had presented themselves at the Mount Sinai Hospital.

Dr. Welt-Kakels also read a paper in which she dwelt more particularly on the treatment of uncinariasis than on that of other intestinal parasites. She reviewed the various methods of treatment of hookworm disease, dwelling at length on the results obtained by various observers with oil of chenopodium.

CUTANEOUS REACTIONS IN CASES OF FOOD IDIOSYNCRASY

DR. OSCAR M. SCHLOSS said he had had the opportunity to study a number of cases of food idiosyncrasy and that there were a few observations concerning the significance and limitations of such tests which seemed of sufficient interest to warrant a brief summary. The test with food substances might be applied by cutaneous inoculation or by means of an intracutaneous injection. The former is the easier method, and for this test food substances may be used which are too irritating to be injected into the skin. The intradermic method, however, was the more sensitive and at times would prove positive when the cutaneous test was negative.

A positive reaction might occur in one of two distinct forms. The most common reaction, especially with the cutaneous test, was the occurrence of an urticarial lesion. This appeared almost immediately after the injection and disappeared within fifteen to twenty minutes. With this form of reaction itching was common but not constant. The second type was analogous to the tuberculin reaction, was inflammatory in character, appeared only at the end of a few hours and was usually most marked after twelve to twenty-four hours. This form of reaction was relatively more common after the intracutaneous test, but was much less frequent than the urticarial type, at least in the cases with which the writer was familiar.

In speaking of the materials used for the test, Dr. Schloss said that foods that were rich in soluble protein, such as egg or milk, might be used unaltered, or simply diluted with saline. It was always preferable, however, to use the proteins in a comparatively pure state, as in this form they were better adapted for intracutaneous tests. Hitherto the difficulty of their preparation had been an obstacle to their use, but recently the writer had obtained some preparations from Dr. Harris, who had had long experience in such work with Osborne and Mendel.

When a positive reaction was obtained in a given case the question naturally arose as to what was its exact significance. Practically without exception such a reaction was indicative of an idiosyncrasy to this particular food substance. The writer stated that he had never seen a clearly positive reaction to a food protein when such food did not cause a toxic disturbance when ingested.

The opposite phase of the question was not so satisfactory, namely, "Does a negative skin reaction exclude the possibility of food idiosyncrasy?" Unfortunately such was not true. There were many cases of food disturbances in which the history was perfectly definite and yet all tests were uniformly negative. As a rule a positive reaction might be expected in the patients who reacted to the toxic foods by the development of skin lesions. In the cases with gastroenteric disturbances only, the cutaneous tests were often negative.

Another influence mitigating the value of the cutaneous test was the occurrence of temporary desensitization. In 3 cases of egg idiosyncrasy the writer had studied this phenomena in detail. In all instances the occurrence of food intoxication was followed by a temporary immunity with disappearance of the cutaneous reaction. One other complicating circumstance which was of importance was the pseudo-reaction. In many infants with sensitive skin an abrasion would cause a distinct wheal which might be mistaken for a positive reaction. The possibility of error would, of course, be minimized by the control test, but in some instances the deciding line was very fine.

In concluding, Dr. Schloss stated that, although the application of the cutaneous reaction to foods to dietetic problems had considerable limitations, yet in some instances such tests were of distinct value and might serve as a therapeutic guide.

THE INTERPRETATION OF THE VON PIRQUET REACTION

Dr. Henry Heiman said that one of the first important valuable diagnostic aids in tuberculosis was the discovery of Koch's subcutaneous tuberculin reaction. On account of certain disadvantages, however, its application was limited. When von Pirquet first suggested his cutaneous test for tuberculosis, in 1907, its advent had been welcomed on account of its simplicity and its almost universal applicability. Since that time its constant use in clinical medicine in the diagnosis of all forms of tuberculosis had so far proved its value that it had practically superseded subcutaneous tuberculin and the Calmette and Moro tests.

The writer expressed the firm belief that if the proper technic was observed one could safely rely, in the vast majority of cases, upon this valuable diagnostic aid. By proper technic was meant the performance of the test in such a manner that only the epidermis was removed by a proper borer. Frequently a needle or scarifier was substituted for the borer. This at once invalidated the test, owing to the opening of capillary blood vessels and the consequent rapid absorption of the tuberculin. The chief object of the cutaneous test was to produce merely a local effect by bringing the existing antibodies, in a case of tuberculosis, to the site of the test, thus causing a union of the tuberculosis antibodies and the tuberculin, the so-called lymphocytic and giant-celled infiltration.

One reason for deprecating the value of the von Pirquet reaction was that too much had been expected from the application of this test. It was not employed with the idea of diagnosing the site of the tuberculous lesion, but merely to determine the existence or non-existence of tuberculosis in the body.

Regarding the interpretation of this test, observation had led to the belief that in the case of an acute tuberculous process, such as a tuberculous adenitis, bone, or apical tuberculosis, a very marked reaction occurred; in subacute or chronic tuberculosis a milder reaction was usually observed; in the last stages of tuberculous meningitis, or in general miliary tuberculosis, the reaction was usually negative. In the last two instances, tuberculous meningitis in its final stage and general miliary tuberculosis, the system had become so overwhelmed by the tuberculous process that the antibodies in the blood had become practically exhausted. Another advantage of the von Pirquet over the subcutaneous or Calmette tests was its almost absolute safety. Dr. Heiman said their observations had shown that it produced no glandular enlargement, no leukocytosis or lymphocytosis, or elevation of temperature. Occasionally it might produce a slight focal reaction, especially in the case of tuberculous adenitis.

The frequency of the von Pirquet reaction at various ages, especially of infancy and childhood, had been studied by various observers and the figures were well known. They had observed in the children's service of Dr. Koplik at Mount Sinai Hospital, in applying the von Pirquet test several times within two or three weeks on the same individual, in a series of 100 patients, that in those in whom the reaction was positive in the first instance it remained positive as a rule in the subsequent tests. In only 3 of the 100 cases did this observation not hold good. Furthermore, they had noted that in the case of tuberculous adenitis, in which the von Pirquet reaction was markedly positive before operation, there was just as marked reaction after radical removal of the tuberculous glands. This could only be explained on the theory that the sensitization of the individual had occurred or that possibly there remained some additional glandular or other tuberculous focus.

Despite the positive value of the test, Dr. Heiman expressed the opinion that its negative value was of still greater importance in excluding the existence of tuberculosis, with the exception of the last stages of tuberculous meningitis and general miliary tuberculosis, both of which, however, could, as a rule, be readily diagnosed at the bedside. The von Pirquet test was of far more value than was generally conceded, and should be more universally employed than at present in cases of doubtful diagnosis in infants and children.

PROGRESS IN THE KNOWLEDGE OF TUBERCULOUS INFECTION

FEVER—THE INITIAL SYMPTOM OF TUBERCULOUS INFECTION IN INFANCY

Dr. Mark S. Reuben read this paper. (See p. 171.)

PROGRESS IN THE TREATMENT OF SKIN DISEASES

Dr. George M. MacKee said that it was not tenable to-day to consider dermatology as consisting of diseases which were limited to the skin and which should be treated by chemical and physical agents externally applied. Probably the most promising evidence of progress in dermatology was in the recognition that most of the dermatoses were intimately related to internal medicine, that the genesis was only occasionally in the skin and that the pathology was by no means limited to the integument. They could never hope to treat skin diseases intelligently and successfully until they possessed a reliable knowledge regarding their etiology, and hence the enormous amount of research work conducted by McBride and Schorer, Rosenow and many others in an attempt to associate the causative factors with the internal secretions, with gastrointestinal disturbances, focal infections. Pathologic or physiologic disturbances in the important viscera, anaphylaxis, etc., must be considered as bearing directly upon the therapeutics of cutaneous medicine. Many of the dermatoses were known to be but external manifestations of internal disturbances. The etiology of such diseases as psoriasis, mycosis, fungoides, leukemia cutis, eczema, erythema multiforme, etc., had not been mastered as had that of syphilis, and hence the treatment of such infections was more or less empirical. Progress in specific therapy had not been particularly noteworthy during the last year or two. Vaccine therapy, especially in relation to ringworm of the scalp, deserved some consideration. Strickler, of Philadelphia, had reported a series of cases that he successfully treated with vaccine therapy, and Sharpe, working in Dr. Fordyce's clinic, had a large number of little patients under treatment in the attempt to confirm Strickler's observations. He was using a polyvalent stick vaccine made from cultures obtained from numerous cases of large and small spored infections. Since the work had been in progress for only a few months, and it took six to eight months to effect a cure, it was too soon to form an opinion, but the results thus far were very encouraging. If this work was successful it would be of the utmost importance to the individual and to the State, since the method could be used by every physician because the stock vaccines would be prepared by large pharmaceutical houses. Engman's success with vaccines in acne vulgaris had not been duplicated in other cities, but Engman himself was as enthusiastic as ever and it was possible that environment might have something to do with the failures in other centers. In New York the acne bacillus vaccine seemed to be of very little value. In pustular acne, however, polyvalent stock mixtures of the staphylococcus were of distinct value if properly used, and combined with other therapeutic measures. Polyvalent staphylococcus stock vaccine appeared to be the best treatment for furunculosis. Tuberculin therapy appeared to be specific for benign tuberculous conditions seen on the legs of young girls and known as Bazin's disease or erythema induratum. It was somewhat efficacious in some instances of lupus vulgaris, but was of no service in lupus erythematosus. The Kromayer lamp probably offered the best means of applying the actinic rays to the treatment of dermatoses, and brilliant results had been reported in psoriasis, alopecia, the cutaneous tuberculoses, lupus erythematosus, navus vulgaris, etc. At Dr. Fordyce's clinic they had found the actinic rays from the lamp to be very efficacious in many cases of acne vulgaris. They had also found it to be of distinct benefit in certain types of psoriasis, eczema and lichen planus. In the more serious and obstinate diseases, such as lupus and nevi, where the ultra-violet rays alone were indicated, they had not attended the same degree of success that was associated with the efforts of their colleagues. Very distinct advances had been made in the treatment of dermatoses with the X-ray, but there was nothing essentially new in the methods, as they had been in vogue in England and on the Continent for some time. The modern technique in experienced hands was accompanied by a high degree of safety. There was a very undecided misunderstanding relative to the comparative value of radium and the X-ray. It should be remembered that there were rays emitted from radium that had varying characteristics, which was also true of the rays emitted from the X-ray tube. The Gamma rays of radium were of all degrees of penetration. Some would pass through almost anything if afforded sufficient time. There were Gamma rays that possessed very little penetrating power. The rays emitted from an X-ray tube were analogous to the Gamma rays of radium, but there was a greater degree of latitude in the penetrability of the Gamma rays of radium. In addition, in the case of radium it was possible to utilize the very marked therapeutic effect of the Beta rays. There were some dermatological conditions which responded more readily to the Gamma rays of low penetration and to the Beta rays than to the more penetrating rays of the X-ray tube. It was this difference that accounted for the superior efficiency of radium as compared with the X-ray in certain dermatoses. Radium had produced very superior results in the treatment of deep-seated vascular nevi, but it was not so efficacious in the port-wine mark. In accessible regions radium could be used to advantage, but where extensive surfaces were to be treated the X-ray was indicated. In conclusion, it might be said that so far as the present and future real progress in the treatment of diseases falling under the heading of dermatology was concerned, they must depend upon the combined efforts of the dermatologist and the internist with the collaboration of the physiological chemist, the bacteriologist and the pathologist.

PROGRESS IN PEDIATRIC SURGERY OF THE BRAIN

Dr. William Sharpe read this paper. He said he wished to speak regarding conditions of cerebral spastic paralysis. There were four chief neurological surgical conditions found in children: (1) Cerebral tumors and cysts; (2) hydrocephalus and spina bifida; (3) brachial birth paralysis due to an injury to the brachial plexus during a difficult labor, and (4) cerebral spastic paralysis due to one of three main causes. The first was a lack of development of the cerebral cortex or its pyramidal tracts, a condition found in children who were badly nourished and usually found in premature babies and for which little if anything could be done. The second was a meningoencephalitis following an infection, usually scarlet fever, measles, etc. The third cause was a cerebral spastic paralysis due to hemorrhage, and especially of intracranial hemorrhage occurring at birth. It had always been believed that such hemorrhage caused a destruction of brain tissue and naturally where there was destruction of cortical nerve tissue there could be no regeneration; consequently it was generally believed that nothing could be done to improve this condition. Many attempts, however, had been made to effect improvement at different times. Some twenty-five years ago operative attempts were made, but the osteoplastic bone flaps were not permanently removed, so that there had been no permanent decompression performed. At this time no attempts had been made to distinguish between cases due to the three different causes of this condition and consequently the results were very disappointing, as many cases were operated upon which could not possibly be helped by any operation.

Of a series of 24 cases operated upon twenty-two years ago, 14 died within six hours after; only 1 case showed any improvement. No selection of cases was made regarding the presence or absence of intracranial pressure, so that it was no wonder that the operation was discredited and had remained so until the present time. Since that time these cerebral spastic paralyses had been operated upon by various methods in order to lessen the spasticity and relieve contractures. These peripheral methods had resulted in only temporary improvement because they did not get at the site and the cause of the condition on the brain. Regarding his first case, he said he was called in June, 1913, to see a child who was in status epilepticus (300 convulsions during the preceding four days) and who had a condition of left spastic hemiplegia. A choked disk was present, owing probably, as he then thought, to the convulsions. A right subtemporal decompression was performed on this child to relieve this pressure, and not only did the child make a recovery, but there was a lessened spasticity so that the child could walk with his left heel on the ground, and he began to use his left hand and arm for the first time in his life. It then occurred to him that some of the cases of cerebral spastic paralysis might show signs of mild intracranial pressure and that it was most important thus to be able to distinguish those cases from the ones that might be accounted for by other conditions, such as lack of development and meningo-encephalitis. He examined carefully these cases with the ophthalmoscope and also by measuring the pressure of the cerebrospinal fluid by lumbar puncture; when he found an increased intracranial pressure he advised a subtemporal decompression. Up to January, 1916, he had examined 832 cases and had advised a cranial decompression in 209; these cases showed an increased intracranial pressure denoting a hemorrhage. He had operated upon 195 cases and had 14 deaths. Of these deaths 7 were extreme diplegias with marked malnutrition, having difficulty in swallowing; 2 occurred from pneumonia, 2 from shock, 2 from infection, and 1 from an enlarged thymus, with a supracortical hemorrhage, as displayed at the autopsy. Permission for autopsy was obtained before operation. In this way the diagnosis was checked up. All of the cases had improved, both mentally and physically, with the exception of 8 patients, who had shown little or no improvement at all. The hemorrhage was usually found lying upon the cortex and extending down to the site of the operation in the more severe cases; these hemorrhagic cysts were visible at the operation in 86 cases. In only 7 cases was it subcortical, thereby causing a primary destruction of nerve tissue. In the other cases the effect of the high intracranial pressure from the hemorrhage upon the cortex was the cause of the spasticity. All of the cases which were caused by hemorrhage gradually became mentally impaired, due to the increase of the intracranial pressure. It might be said that on the average, 1 in 4 of these 832 cases showed signs of increased intracranial pressure, making an operation advisable. In this series of 209 cases due to intracranial hemorrhage, all were first children except 16; all were full-term children except 5; only 33 did not have convulsions within one week after birth; the spasticity was not observed, as a rule, until about the eighth month; the condition of these children was not recognized and no attempt was made to alleviate the spasticity because it was not observed until they were eight or nine months of age. All the children in this series showed definite signs of an increased intracranial pressure by the blurring of the nasal margin or halves of the optic discs, and the cerebrospinal fluid was under high pressure as measured by lumbar puncture. A Wassermann test of both the fluid and cerebrospinal fluid was made in all cases with no exception. Moving pictures of the patient's gait and contractures were taken before and at regular intervals after operation. Simon-Binet tests of the mentality were also similarly made before and after the operation. The operation performed consisted in a subtemporal decompression; the bone was removed, leaving a permanent decompression. The dura was always opened and left open. The operation usually required less than forty minutes, and could be done with absolute hemostasis—a feature that was very essential in children of this age. Any rapid loss of blood caused great shock. It was also essential to prevent a large loss of the spinal fluid, as a high rise in temperature due to a circulatory disturbance of the basal ganglia might result. In some instances the temperature might rise to 106° or 107° F. In such instances Dr. William Giles had learned that the head should be lowered to a marked degree, the child being almost stood upon his head. In this posture the temperature would come down very rapidly, since gravity helped to equalize the intracranial pressure. This rise in temperature and its rapid fall following the lowering of the head showed that the high temperature was due to a loss of spinal fluid. Regarding the anesthesia, Dr. Charles Hunt had used a special method consisting of heated oxygen and ether which was very successful.

The after treatment was the same as the pre-operative treatment; all the cases had been given the routine hospital treatment for spastic paralysis, massage, active and passive exercises, braces, etc. The effect of the operation upon the mentality of the child was observed by the Simon-Binet tests. Some of these children improved immediately after operation, both physically and mentally, and began to notice things and to take an interest in their surroundings within a few days following the operation. Of 82 children who had convulsions before the operation, 36 were not having them now, and in many of the others the convulsions were less frequent and less violent. The prognosis was always bad in cases of convulsions where the children had had them for any length of time.

In conclusion, Dr. Sharpe stated that most of these children were practically derelicts at the time they were operated upon, but if a diagnosis had been made early and shortly after birth, and an operation had been performed, normal children might have resulted. Three of his cases were operated upon on the second day and two on the third day after birth, and normal children were obtained. The older the child, the less improvement could be expected. The oldest patient was twenty-one years of age, and he had improved less than the younger patients, the average age being five years. Dr. Sharpe said he did not advocate this procedure as a cure in the older children, but it did offer an opportunity of giving these children, who were otherwise hopeless, a chance of improvement. The earlier the diagnosis and operation in these selected cases, the more normal the child.

DISCUSSIONS

Dr. José A. Diaz, of Porto Rico, at the request of the Chairman, spoke of uncinariasis. He said that before the occupation of Porto Rico by the American Army the population of Porto Rico suffered greatly from anemia, and it was supposed that this was due to lack of good food, and therefore their apparent laziness. One year after the American flag was waving over Porto Rico a hurricane swept over the country, devastating the island and causing a scarcity of vegetables and other food. It was then discovered that the anemia from which the people were suffering was secondary to uncinariasis, and since that time they had been curing the disease down there.

The people lived in a very primitive way and wore no shoes in the fields. The houses in the rural districts did not have cesspools; their fecal matters were discharged in the ground and soil, which became so infected that almost everyone got the infection. This easily occurred, as the embryos entered the bare foot, making their way through the skin to the lymphatics, blood vessels and intestines, where they located, lived, and multiplied. Sometimes the infection took place through neglect to wash the hands and carrying the food to the mouth with soiled hands.

The treatment they gave consisted in thymol, from 2 to 4 grams in eight capsules and sulphate of soda administered in the following way: Twenty grams of sulphate of soda were given at bedtime; of the eight capsules, on the following morning at six o'clock they gave four, and at eight o'clock four more; then at ten o'clock they gave 20 grams of sulphate of soda. The diet during the day should be fluid, avoiding wines, alcoholic drinks and oils. On the following day the patient could take any kind of food. This course of treatment was repeated every week until the patient was free from uncinaria. They gave written instructions with the treatment as follows: "Build yourself a cesspool, and do not evacuate your bowels in the fields; wear shoes and wash the hands always before eating. Do not drink wine or alcoholic beverages."

With this form of treatment they had reduced the percentage of anemics considerably and had saved the lives of thousands of people. They had transformed the population of Porto Rico into a good, healthy, strong, and hard-working people, under conditions as good as those of the most civilized countries.

The disease had been so severe in some cases that lunacy had resulted, and even after the patient had become insane, in some cases treatment with thymol had resulted in a cure. Dr. Diaz said he was confidently expecting that the disease would be greatly decreased as the people learned to live in a more sanitary manner.

The anemic service had been in the hands of the Sanitation Department, to which he had the honor to belong, and took great interest in teaching the people at large how to live and to protect themselves from disease in general, but especially from uncinariasis. There was now a law compelling every householder to build a cesspool, and in the event of failure to do so the Government builds the cesspool and charges the same to the property holder.

To sum up, it might be said that the treatment of uncinariasis and the regulations to prevent it have operated to effect a change in the community of Porto Rico, not only in its sanitary, but in its social and economic aspect, and the benefit of this work is affecting not only the poor, but the rich population of Porto Rico.

The Legislature provides an amount of money each year for the treatment of uncinariasis, and in time, it is believed, the disease will be banished from the Island of Porto Rico.

Dr. William P. Northrup said that these papers had been interesting in many ways, but the first and last papers had impressed him most in speaking of progress. A great work had been done over the whole country in taking these people who were anemics and derelicts, these victims of hookworm disease, and making them useful and self-supporting. The work of Dr. Sharpe in taking the class of cases he had described and operating on them when they offered so little hope of success was certainly to be commended. These children were all derelicts and had been considered hopeless. Dr. Sharpe deserved great credit for an attempt to restore them in any degree, and if he succeeded in redeeming even one or two cases the work was quite worth while. If these cases could be recognized in their early stage and restored, this certainly was progress.

The struggle to do for the poor was frequently discouraging, but it was interesting to see what might possibly come out of such work, even though it was tedious and trying. Dr. Sharpe had youth and courage, and he hoped that he would get some reward for his efforts.

Dr. Maurice Fishberg said he would like to add to what Dr. Heiman had said that a distinction was always to be made between infection with tubercle bacilli and the disease due to the same virus. Now, there was hardly one who had escaped infection, while comparatively few were affected with tuberculosis. All infected persons must react to tuberculin. Moreover the specificity of tuberculin had not been proven conclusively to the satisfaction of all entitled to an opinion. Indeed, tuberculin was not the only substance producing a reaction in a person infected with tuberculosis. Any foreign albumin inoculated into the skin of a person harboring tubercle bacilli produced a reaction indistinguishable from the cutaneous tuberculin reaction; other toxins, especially those of diphtheria, dysentery, cholera, etc., gave skin reactions exactly like that of von Pirquet. The fact that the von Pirquet reaction is negative during the terminal stages of tuberculosis and also in tuberculous meningitis, whooping cough, and diphtheria militated against its utility as a diagnostic agent in children when it was most needed. Tuberculin was not a simple, definite substance, but a mixture of the toxins of the tubercle bacilli and glycerin salts, extractives, etc., contained in the medium in which the tubercle bacilli were grown. These substances without the tuberculous toxins produced the same reaction on the skin as the tuberculin. Dr. Fishberg said he was glad Dr. Reuben had followed infants reacting to tuberculin during the first few months of their lives for several years, and had found them thriving. He had reported similar cases some two years ago in the ARCHIVES OF PEDIATRICS. This proved that the opinion, that an infant under one year of age infected with tubercle bacilli invariably perished, was not well founded.

DR. ABRAHAM L. GOODMAN said that he saw a great many children during the course of a year, and had been struck by the large percentage that were infected by tuberculosis. Many of these infections were not recognized unless the child showed marked physical signs of the disease. At the German Hospital for the past four years they had been making it a practice to take an X-ray of the chest whether the child showed pulmonary involvement or not. They had found a large number of children suffering from enlarged mediastinal and peribronchial glands, and they placed a great deal more stress on the finding of enlarged mediastinal glands as an indication of tuberculous infection than on other signs. Of the physical signs they had found the signs in D'Espine's triangle of most importance. These were the earliest recognizable signs of tuberculosis in infancy. Fever of indefinite origin was in most cases due to tuberculous infection. They had been X-raying these cases for three or four years, and made the diagnosis in the early life by exclusion, and by the changes in the temperature chart. In the treatment of early tuberculous infection in the mesenteric mediastinal or peribronchial glands, or anywhere inside of the body, as in the neck, they had been successful with guaiacol and arsenic in addition to the usual hygienic measures.

Dr. F. L. Wachenheim said that if there were enlarged glands in the neck, as shown by D'Espine's sign and the X-ray, they were not significant of tuberculosis in the presence of a negative von Pirquet reaction. In their clinic they were not obtaining the large number of von Pirquet reactions that some others were getting. They were only getting positive von Pirquet reactions in 10 or 15 per cent. Again, one might get the von Pirquet reaction in cases that were latent or cured. Active pulmonary tuberculosis usually began at from fifteen to twenty-five years of age, and children of school age usually showed no signs of tuberculosis. Of course they had no guarantee that these cases showing no physical signs of the disease and yet giving a positive von Pirquet reaction were well. They should be very closely watched. It was a pity that institutions did not take children giving a positive von Pirquet reaction, even if they did not show signs of active tuberculosis, since they ought to be watched and given a chance to overcome the infection.

Dr. Brainerd H. Whitbeck said that Dr. Sharpe's work was of the greatest importance to the pediatrician and also to the orthopedic surgeon. They had previously been doing tenotomies, fasciotomies, and cutting the posterior nerve roots, none of which procedures had been followed with any great degree of success, while recurrences were frequent. The operation which Dr. Sharpe was doing offered very much more hope. In some of the cases in which Dr. Sharpe had operated there were no longer any convulsions and the walk was progressively improving; in some of the cases in which there was only moderate mental impairment, improvement in the mental condition had been observed.

Dr. Henry Heiman said that in answer to Dr. Fishberg's remarks as to the possibility of confusing the von Pirquet reaction with a reaction due to proteins, there was no occasion for such a mistake, as the protein reaction disappeared in a short time, while a genuine von Pirquet reaction remained for weeks. The von Pirquet differed from the Schick test in that a Schick reaction means that the individual reacting positively has no natural antitoxin, while if he did not react it meant that he did not require antitoxin and was not susceptible to diphtheria.

In reference to the diagnostic value of the tuberculin test, Dr. Heiman said he would not dream of making a positive diagnosis of tuberculosis of the lungs merely from a positive von Pirquet reaction. One can make a positive diagnosis of tuberculosis of the lungs only when the tubercle bacilli are found in the sputum, or when there is a positive von Pirquet reaction plus corroborative evidence furnished by the X-ray. One can no more make a positive diagnosis of tuberculosis of the lungs merely by the von Pirquet reaction than a diagnosis of malaria without finding the plasmodium or a diagnosis of hookworm without finding the parasite.

Frequently those using tuberculin to make the von Pirquet tests dilute it. When the tuberculin was diluted it decomposed very rapidly, but this did not happen if it remained undiluted. In full strength tuberculin would keep for a long time.

With the von Pirquet test a negative reaction is of great value, which is just the opposite of what is true concerning the Wassermann reaction, in which a negative reaction meant nothing. A negative von Pirquet reaction meant that the individual giving such a reaction has no tuberculosis except as was said in the terminal stages of tuberculous meningitis and general miliary tuberculosis.

As to the reason we get so many positive von Pirquet reactions and the patients get well, it must be remembered that the patients are treated with fresh air, change of environment, careful diet, etc., and this was the reason many more improved than in former years.

Dr. Mark S. Reuben said he was sorry he had to disagree with Dr. Fishberg. The von Pirquet reaction was not an anaphylactic reaction; tuberculin could be produced in the form of a polypeptid; such tuberculin would produce a positive reaction in a tuberculous patient, thus proving that the tuberculin reaction was not an anaphylactic reaction, for polypeptids did not act as anaphylactic antigens. There was not a single authentic case on record in which a positive reaction was obtained which did not show a tuberculous focus at autopsy. In cases in which there was no macroscopic or microscopic lesion demonstrable, injection of emulsion of cervical, bronchial and mesenteric glands into guinea pigs invariably produced tuberculosis. In repeating a von Pirquet reaction one always obtained a positive reaction if the first was positive, thus anti- or katanaphylaxis could not be produced; in other reactions it was the usual occurrence. In the tuberculin reaction an incubation period was not noted. In all other reactions it could not be annihilated even if repeated any number of times. The tuberculin reaction had a papule and an areola. In other reactions, usually no such distinctions could be made, and the greatest inflammation was at the periphery. The inflammation in local anaphylactic reactions when repeated was always greatest at the periphery. This was never so in tuberculin reactions. Dr. Fishberg stated that glycerin bouillon produced the same kind of reaction as tuberculin. Hamburger proved that the pseudo-reaction sometimes obtained in the non-tuberculous patients was due to the irritant action of the glycerin bouillon contained in the tuberculin, and that it had nothing in common with a true tuberculin reaction. Moreover, histological studies of a local tuberculin reaction showed that it was composed of cells similar to those found in tuberculous tissue, whereas all other reactions showed signs of simple inflammation. Dr. Reuben said he thought from the evidence adduced the tuberculin reaction was an entirely specific reaction.

MALIGNANT FORM OF ACUTE INFECTIOUS DISEASES—Hutinel (Archiv. des Méd. des Enf., Paris, January, 1915, Vol. XVIII., No. 1, pp. 1-60) remarks that we cannot speak of malignant scarlet fever, as there is no single type, but a whole range of types, of malignant scarlet fever. He gives a historical sketch of the disease and classifies the malignant types as the fulminating, the ataxo-dynamic, the syncopal, the hemorrhagic and the tardy malignant. There have been 34 cases of the malignant type in his service during the last fifteen months in a total of 550 scarlet fever cases; in a previous series of 833 cases there were 37 that terminated fatally. The various features of the malignant types are reviewed and the complications. Recovery was the rule in the cases with destructive lesions in the throat; the defects in the tissues grew up in time and no operation was required. In this and other complications the loss of vitality in the tissues was evidently responsible for the destructiveness of the process, as the germs involved never seemed to be particularly virulent. Suppurative otitis was encountered in only 15 cases and it usually healed without complications, but in 4 cases mastoiditis developed.—*Journal of American Medical Association.*

THE PHILADELPHIA PEDIATRIC SOCIETY

Stated Meeting, Held February 8, 1916

President Dr. John E. Sinclair in the Chair

This was the annual Packard lecture and the address was delivered by Dr. Charles Macfie Campbell, of Johns Hopkins.

Dr. Campbell said that the intensive work done during the last twenty years on the functional nervous disorders of the adult had brought about a marked change of attitude in dealing with them. We are less inclined to attribute these disorders to hypothetical intoxications, nor are we satisfied with a mere reference to the basis of constitutional psychopathic inferiority on which they arise; the aim is now to find the meaning of each disorder, the rôle that it plays in the adaptation of the individual to the environment.

The unembarrassed study of the real biologic unit takes us beneath the surface to other dynamic factors, to more elemental but deeply rooted forces which drive us, but which we are used to ignore.

Neurotic symptoms to a large extent find their explanation in these underlying trends and among the determining factors of the symptoms a prominent place must be given to the attitudes, the problems and the conflicts of childhood.

The child may have an unsuspected complexity of forces determining his behavior. The recognition of this complexity may enable us to understand some of the nervous manifestations of childhood, which otherwise would be unintelligible. The child's life at an early age may show indications of conflicts which tradition only admits in the adult. It may seem rather revolutionary to allow to a child of tender years an emotional life of such complexity.

In the treatment it is important to recognize the real factors involved and not to be satisfied with vague hypotheses as to toxic processes or with references to constitutional instability.

In speaking of the neurotic utilization of symptoms, Dr. Campbell said that symptoms may arise in various ways: they may be the result of personal compromise, or they may be the expression of a nervous instability, which needs no special conflict to elicit them, or they may even be the product of some casual somatic disorder; once they have arisen they may serve a certain function and be made use of for the adaptation of the individual to the environment.

Among the gastric symptoms presented by neurotic children, vomiting is not uncommon, and in some cases this symptom forms a very serviceable help to the child for the attainment of his ends.

Headache is another symptom which the child finds easily at his disposal in the face of unpleasant situations.

Of the nervous manifestations of childhood none are more alarming than the various attacks which are liable to occur. The diagnosis of epilepsy is often difficult, and it is well to keep in mind the possibility that an attack, even though presenting some of the features of an epileptic equivalent, may really form part of a subtle mechanism by which the child attains a desired goal.

Dr. Campbell pointed out that the fact that a symptom in some cases may be utilized in a certain way or may indicate certain conflicts does not entitle us to conclude in all cases that it is so utilized and must always indicate such conflicts.

In the origin of neurotic symptoms in general we are depending on the researches of the pediatrists, employing biochemical and physiological methods.

The pediatrist, by the application of accurate methods to the study of these early symptoms, may contribute to psychopathology a much clearer formulation of the basis of some types of nervous constitutions.

SUBCUTANEOUS EMPHYSEMA IN MEASLES—In the case of which Méry and Girard (Archiv. de Méd. des Enf., Paris, January, 1915, Vol. XVIII., No. 1, pp. 1-60) give an illustrated description, the eruption had subsided normally when the boy's cheeks and neck became puffy. The emphysema spread to cover nearly the entire body and it persisted for three days, then gradually vanishing, although crepitation was perceptible in the back for a week longer. In a second case the emphysema developed with the eruption but kept up longer. In these, as in 4 similar cases on record, the measles was of a mild form without complications. The emphysema did not cause pain, but there was some difficulty in breathing.—*Journal of American Medical Association.*

DEPARTMENT OF ABSTRACTS

Original Condensations of Current Pediatric Literature by the Editors and the Following Associates

T. Wood Clarke	Utica, N. Y.
Coleman W. Cutler	New York City
Charles E. Farr	New York City
Morris Friedson	New York City
Gaylord W. Graves	New York City
Howard K. Hill	Philadelphia, Penna.
Jerome S. Leopold	New York City
William Lyon	Jackson, Mich.
Stafford McLean	New York City
Carlo D. Martinetti	Orange, N. J.
Raymond B. Mixsell	Pasadena, Cal.
Rudolph D. Moffett	New York City
Willard S. Parker	Boston, Mass.
Mark S. Reuben	New York City
Mills Sturtevant	New York City
Samuel W. Thurber	New York City
Eugene F. Warner	St. Paul, Minn.
Edwin T. Wyman	Boston, Mass.
J. Herbert Young	Newton, Mass.

Bryan, J. H.: Report of 2 Cases of Mastoid Abscess, Infective Thrombosis of the Lateral Sinus and Jugular Vein. Resection of the Jugular. Recovery. (Annals of Otology, Rhinology and Laryngology, September, 1915, p. 543.)

Articles in the various journals are constantly reporting more and more ear complications occurring in the young, so that one is impressed with the seriousness of any ear infection.

The first case, a girl of thirteen years, had been ill with influenza for two days. Her left ear was involved and the drum ruptured during the first twenty-four hours. When first seen, she had a temperature of 104°, with intense pain in the ear and a bloody, purulent discharge. In thirty-six hours she had a severe chill and her temperature rose to 105°. Operation revealed a mastoid filled with pus and marked bone destruction. At this time there were no signs of sinus infection, but two days following the operation her continuous high temperature suggested the necessity of exploring the sinus, and at the bulb a peri-sinus abscess was found. The sinus itself was now opened and a firm clot found that extended from the knee to the bulb. Two and a half inches of the jugular were removed. Cultures showed streptococcus infection of the vein and sinus. Two days after this second operation the patient had another chill and was given 10 c.c. of an antistreptococcus serum. Again on the following day, owing to a high leukocyte count, she was given a second injection of a like dose. On the following day she was given twice as much serum and from that time onward her temperature remained normal and she made a good recovery. In this case the infection took place from the peri-sinus abscess that was not located at the time of the first operation.

The second case reported was a girl of seven years, who had been ill with influenza for a number of days and for two days had been complaining of pain in her right ear. A paracentesis had been done and there was a profuse, thick, purulent discharge. Some tenderness over the mastoid was noticed, but on account of the general irritability of the patient it was difficult to judge how real this was. The next day the temperature suddenly rose to 101.4°, and the next morning it was 104°. She was immediately sent into the hospital and the mastoid opened. It did not appear that the sinus was involved, so it was not touched. For eleven days she apparently did well, when she had a restless night and a subnormal temperature in the morning. On opening the sinus, a thrombus was found that extended into the jugular, which was removed for a length of two and a half inches. A culture showed staphylococcus pyogenes, from which a vaccine was prepared. The temperature continued irregularly, and four days after the second operation ½ c.c. autogenous vaccine was given. For three days she ran a septic temperature, and 20 minims of the vaccine were given. The child then developed an abscess on the outer part of the left leg. This was incised and a large quantity of thick, greenish pus evacuated. Recovery from this time on was uneventful. S. W. T.

BOOT, GEORGE W.: CASES OF LATERAL SINUS THROMBOSIS. (Annals of Otology, Rhinology and Laryngology, September, 1915, p. 554.)

A boy of four years had acute suppurative otitis media following scarlet fever. This patient was first seen May 8, 1914, and during nine days 55,000 units of diphtheria antitoxin were given because his nose was filled with false membrane. Both ears began to discharge on the sixth day. On May 30th a simple mastoid operation was done on the left side and on June 10th this sinus was found to be thrombosed. The second operation was performed on account of variations in temperature of 11° in a few hours. On June 12th he tore off all his dressings and nearly bled to death; this again occurred on the 14th and the patient died on the 16th. Cause of death was probably toxemia from the scarlet fever assisted by the loss of blood and probably by the large amount of diphtheria antitoxin.

The second case was a girl of three years who had an acute otitis following pneumonia, the ear infection developing two weeks after recovery from pneumonia. Five days after admission to the hospital swelling became apparent behind the ear and a mastoid operation was performed in which the lateral sinus was exposed and found to be thrombosed. At this time the jugular vein was not explored; but a week later it was found necessary to clear it out, as it was filled by a long thrombus. The recovery was prompt. S. W. T.

ADOLF BAGINSKY: ON THE TWENTY-FIFTH ANNIVERSARY OF THE KAISER AND KAISERIN-FRIEDERICH HOME FOR SICK CHILDREN AT BERLIN. (Archiv. für Kinderhk., November, 1915, pp. 1-44.)

The first part of this paper is devoted to an historical review of the institution, which really is an autobiography of Dr. Baginsky. In the part devoted to the clinical observations made at this institution the writer takes up a study of the use of K I in the treatment of acute inflammatory diseases of the respiratory and circulatory apparatus, the use of strophanthus in decompensated hearts, poisoning with bacillus enteridis (Gärtner) in 3 children, and, finally, takes up a study of 5 cases of epidermolysis bullosa.

Three children of the same family who had eaten a turnip-cabbage combination became suddenly sick; a fourth child, who had not partaken of these vegetables, was not affected. Of those affected, 1 became sick within twelve hours, 1 within twenty-four hours and the last within forty-eight hours. There was sudden onset of high fever, with severe general symptoms; vomiting and general nervous symptoms were very marked; convulsions and drowsiness were associated with involvement of the heart, rapid pulse and dangerous signs of general weakness. Of the gastrointestinal symptoms there were present both vomiting and diarrhea, which was marked by enormous outpour of blood-stained mucus. Examination of feces revealed the presence of bacillus enteridis (Gärtner). (1) On Drigalski nutrient blue cultures grew, (2) grape sugar was fermented, (3) fluorescent on neutral agar, (4) no curdling of milk, (5) lacmus whey became intensely blue after twenty-four hours, (6) bouillon became cloudy with a formation of a pellicus. This bacterium proved fatal for rats in twenty-four to thirty-six hours. This bacterium became agglutinated with Gärtner's immune serum. Examination of the original food could not be made, but the stools were examined in 2 of these cases and gave identical results.

Epidermolysis bullosa, or keratolysis, is frequently described as an hereditary affection. In the first case the writer could ascertain no hereditary influence; he could not substantiate the statement that these bullæ recur in places of trauma or where great pressure had been made; and he could find no suitable etiologic factor in the diet of this case. In Case 2 adrenalin was of some advantage; in Case 3 the eruption subsided after an attack of grippe. Luithlen divides this disease into two forms—depending on the localization and on the course of this disease. The writer, however, does not agree with Luithlen. None of these cases of Baginsky showed any familial or hereditary tendencies. He believes that contagion plays an important factor in this disease; he found streptococci in these bullæ. He believes this condition to be a form of folliculitis, in which, however, the superficial layers of the skin are affected.

This disease is very resistant to medication and runs a very prolonged course. It is characterized by development of bullæ on the extremities, face and trunk, which burst and form hard scabs; recurrences are frequent. In spite of this eruption, children continue to thrive and gain in weight. Vegetable and purin-free diet were of not much use; arsenic and adrenalin were of doubtful value; externally dry powders were best; all forms of baths are directly injurious. M. S. R.

PERUET, GEORGE: A CASE OF EXTRAGENITAL PRIMARY CHANCRE OF THE WRIST. (The British Journal of Children's Diseases, October, 1915, p. 296.)

The case was a boy of fifteen, who came under observation for a widespread papulo-tenticular rash affecting the face, trunk and limbs and quite characteristic of syphilis. In addition there was multiple adenitis and also typical syphilitic ulceration of the throat. The patient looked pale and ill; there was no headache; there was no primary sore around the genitalia, which were carefully examined from the exclusion point of view, as there had been noticed a raised convex lesion situated on the radial side of the flexor surface of the right wrist. This was under a simple dressing and was only displayed when that was removed. The diagnosis was confirmed by the induration and by the fact that the corresponding axillary glands were greatly enlarged and hard. The epitrochlear gland was not involved. This could be explained by the fact that the primary chancre was situated on the *radial* side of the wrist. The syphilitic infection had occurred after slight injury to the wrist—a scratch from a piece of wire—which had festered. This had taken place three months before the patient was first seen, when he gave about two weeks as the duration of the rash. The only clue as to the origin of the syphilis was the statement that a man with a bad skin rash had lodged in the house. H. R. M.

MORSE, JOHN LOVETT: THE TREATMENT OF RESPIRATORY DISEASES IN INFANCY AND CHILDHOOD. (Journal of the American Medical Association, January 8, 1916, p. 71.)

The author comes to the following conclusions: Fresh air is of advantage in the treatment of all diseases of the respiratory tract. It is also of advantage to have the air pure, that is, free from bacteria, dust and smoke. Cold air is of advantage in some conditions, but harmful in others. It must be used with discretion. It is not possible to treat all diseases of the respiratory tract in the same way. H. R. M.

KAHN, L. MILLER: SOME ACUTE SURGICAL DISEASES OF THE ABDOMEN. (New York State Journal of Medicine, April, 1915, p. 135.)

The recent development of abdominal surgery in the child has been great and gratifying.

There are notable differences existing in the surgical problems presented by the adult and by the child, due to the extra-uterine development taking place in the first few years of life. The migration of the cecum from the left side to the right iliac fossa may be the cause of many interesting anomalies, as the left-sided retrocolic and high-placed, right-sided appendices.

The omentum of the child is very small and flimsy, affording little protection. The mesentery of the appendix is often very short, hence an acute inflammatory process in the appendix will cut off a relatively larger blood supply and gangrenous perforations of large size are more likely to result. The coats of the appendix are also more delicate; the intestinal walls are less able to resist the passage of microörganisms. The persistence after birth of the mesenteric duct (Meckel's diverticulum) may cause peritoneal infection or intestinal obstruction. Failure of normal openings in the abdominal wall to close result in hernias, which may become obstructed or strangulated. The fetal bands of Treves and of Jonnesco often persist through early life, producing obstruction.

The most common acute conditions in children are appendicitis, intussusception, pneumococcus peritonitis and intestinal obstruction. Appendicitis occurs as early as four weeks (Stettiner), but is most common after two years. Some consider appendicitis in children as a chronic disease with acute exacerbations. In diagnosis the history of sudden attacks of pain, vomiting, abdominal rigidity, tenderness, shifting of the pain and tenderness from the epigastrium to the right lower quadrant, and rise of temperature, are most valuable. A mass is often felt in the right lower quadrant. When the appendix is adherent to the bladder there are often urinary symptoms. A high leukocytosis (40,000) suggests pneumococcus peritonitis. Quain suggests allowing palpating hand to rest on the abdomen; if case is one of pneumonia, the muscles will relax in a few minutes. Immediate operation in appendicitis is imperative.

A simple explanation of the frequent intussusception in childhood is that an area of irregular muscular contraction in the intestine acts as a foreign body and that this irregularly contracting area is passed on into the succeeding loop, especially as there is the greater relative length of the mesentery and a greater freedom of movement of the intestine.

Sudden onset of pain (screaming), shock evidenced by blanching, vomiting, blood and mucus in the stools, followed by failure of bowel movement leads to a diagnosis. Often there is felt a sausage-shaped tumor in the abdomen, or a mass in the rectum. The intermittency of the screaming is characteristic.

In intussusception without obstruction there is often no abdominal distention and no abdominal masses. The intermittent intestinal spasm, visible intestinal contraction, and the subnormal temperature at first, lead to a diagnosis. In the operation Kahn advises that the incision should always be on the right side of the abdomen, at a level with the tumor, or if no tumor, with the umbilicus at its mid point, as the intussuscepted mass is usually under the liver or in the epigastrium. In pneumococcus peritonitis the portal of entry may be through the bowel wall, through the blood stream, through the lymphatics by direct extension from the pleura, or through the tubes in the female. It may occur independently of any lung involvement. Ordinary signs of peritonitis with pain, tenderness, some muscular rigidity, vomiting and later a doughy resistance of the abdomen, are present. Characteristic symptoms are diarrhea, great prostration, and a high leukocytosis. If absolutely certain that pneumococcus peritonitis were present, the author advises to await the subsidence of the acute stage and operate in the more favorable stage of localized abscess.

Obstruction of the bowel in hernia openings is not common. The protruding loop may become strangulated even in very small children. The hernia openings should be examined in cases of unexplained vomiting. Meckel's diverticulum persists in only 2 to 4 per cent. of all individuals. In males severe abdominal symptoms are produced by torsion of the spermatic cord and by undescended testes.

Infection of the gall bladder or perforations of gastric or duodenal ulcers are conditions practically unknown in children. No examination of a child is complete without a bimanual palpation of the abdomen. All acute conditions in the abdomen of the child have a way of giving warning by a sudden onset, which is followed by a period of quiescence. Children stand operation well, but care must be taken not to go beyond the "margin of safety." Exposure of viscera, loss of blood and prolonged anesthesia affect children badly. C. E. F.

HACKER, VON: RESTORATION OF THE ESOPHAGUS BY AN ANTETHORACIC TUBE OF SKIN AND LARGE INTESTINE. (UEBER OESOPHAGOPLASTIK IM ALLGEMEINEN UND ÜBER DEN ERSATZ DER SPEISER ÖHRE DURCH ANTETHORACIKALE HAUT DICK DARMSCHLAUCH BILDUNG IM BESONDERN.) (Verhandlungen der Deutschen Gesellschaft für Chirurgie, 1914, Vol. XLIII.)

A case of an antethoracic plastic operation upon a child twelve years old is reported by the author. The stricture of the esophagus reached from the bifurcation to the cardia. The esophagus ended in a blind pocket 2 cm. beneath the bifurcation of the trachea. Following Vulliert's method, on June 19, 1913, the transverse colon was drawn out with the fingers. The liver end was implanted above the greater curvature as far as possible upon the anterior stomach wall. The spleen end was fixed under the skin in front of the thoracic wall 5 cm. under the clavicle. The wound healed by primary intention.

In the second operation on July 29th a neck incision was made at the inner edge of the sternocleidomastoid and the interthoracic blind end of the esophagus was brought out and the neck esophagus fixed beneath the skin in front of the thorax, about 5 cm. from the opening of the intestine. This interval was filled in with a tube of skin at the third operation, October, 1913. This healed well, except for a small fistula, which healed spontaneously later. The whole plastic operation covered a period of five months. On December 6th a fourth operation was performed and a new insertion of the stomach end was made into the lesser curvature, as the first insertion on the anterior wall had closed. A portion of the gut 10 cm. long was first resected. Since the end of December the child was able to enjoy all kinds of food by mouth. So on the second day of February the stomach fistula was closed.

The author emphasizes the possibility of shortening the whole time of the operation by implanting from the first the intestinal esophagus into the lesser curvature of the stomach. He further mentions the good condition of the blood vessels, the motility of the segment of the colon, that food was retained for a long time in the new-formed esophagus before passing into the stomach and that intestinal movements were present in the transplanted intestine for ten and one half months. C. E. F.

NILES, WALTER L.: DYSPITUITARISM, PARTICULARLY OF THE POSTERIOR LOBE. (Medical Record, January 1, 1916, p. 6.)

The author points out that all recent studies of the pituitary body tend to substantiate the conclusion of Cushing, that it is a dualistic organ, both anatomically and functionally. The anterior lobe influences, if it does not control, skeletal development, while the posterior lobe is related to the processes of metabolism, especially the assimilation of the carbohydrates. Experiments and clinical observations justify the assumption that functional hyperplasia of the *pars anterior* results in gigantism if it exists prior to completion of epiphyseal union, while such hyperactivity subsequently to epiphyseal union produces acromegaly; hyposecretion retards skeletal growth and may result in infantilism. Insufficiency of the secretion of the *pars posterior* leads to adiposity with increase in tolerance for carbohydrates, while an excessive secretion causes wasting of the tissues with relative intolerance for carbohydrates. These functional disturbances may result from tumors of the hypophysis, or pressure upon it from adjacent growths, hydrocephalus, or increased intracranial pressure from any cause, and they may possibly occur without any gross change whatever. As the secretion from the posterior lobe reaches the blood stream by way of the cerebrospinal fluid, stasis of this secretion may result in changes similar to hypoplasia of the gland. Most examples of dyspituitarism give evidence of more or less disorder of both lobes, but usually with predominant symptoms referable to one of them. The author reports 2 cases of posterior lobe hypopituitarism.

Case I. was of interest because the dyspituitarism began before puberty and was accompanied by changes in one bone (the neck of the femur), which resulted in permanent deformity. Whether this was the result of hypopituitarism is problematical; it, however, differed from any familiar condition and, considering the rarity of both affections, the chances are in favor of their association with each other. The only evidence of anterior lobe disturbance was the rather large skeleton, but without the usual features of acromegaly.

Case II. showed all the known symptoms of posterior lobe hyposecretion without any evidence of disturbance in the anterior lobe or other ductless glands. The case had cerebrospinal syphilis without definite indications of a tumor in part. It seemed possible that syphilitic changes had developed in the pituitary gland. H. R. M.

SMITH, W. MITCHELL: A CASE OF EXTENSIVE PIGMENTED AND HAIRY NEVUS WITH MOLLUSCOUS TUMORS. (The British Journal of Children's Diseases, October, 1915, p. 299.)

The patient was a girl, aged eight years, the eldest of 4 children. The father and mother were healthy and there was no family history of birth marks or deformities. The child was born at full term by normal labor, there was no history of maternal impressions, and the mother has had no miscarriages. At birth the face, trunk and limbs were covered with dark, reddish-brown marks, which have since grown larger in proportion to the growth of the child. Present condition: Almost the whole of the cutaneous surface is covered with pigmented patches, varying in color from reddish-brown to dark brown; some are covered with long and abundant hair, while others are smoother and show shorter hairs. The skin of the back, especially along the spine, shows a dark pigmentation and is covered with coarse, long hair. The skin of the left leg is also very dark and hairy, both front and back. In the unaffected areas, which are chiefly seen on the forearms and back of the right leg, the skin is in excellent condition. On the left arm and leg, which are thinner than the right, the lesions are more pronounced than on the opposite side. The left upper arm is most wasted and here the whole of the skin is diseased, and resembles a monkey's in texture. In addition to the nevi, the child presents a number of molluscous tumors. The largest, which is about four inches long, is attached to the inner side of the left buttock and perineum on the left side, and is divided into two lobes by a fissure midway along the perineum. A second tumor is to be seen external and inferior to it in the mid-line of the buttock. A third growth arises from the mons veneris. Incipient molluscous formation is also present in a large, round patch on the right forearm, just above the wrist, on a blackish-brown patch on the outer aspect of the right upper arm from the shoulder downward, and on a similar though smaller patch on the corresponding area of the left shoulder.

Apart from the skin condition with the difference in size of the limbs on the two sides, the child presents no abnormality. She is intelligent and strong, and has always had good health. In a case like this extensive treatment was impossible, but some improvement may be obtained in the lesions by the use of nitric acid, phenol, or carbon dioxide snow. H. R. M.

IMPERATORI, C. JOHNSTONE: REPORT OF A CASE OF TRAUMATIC MASTOIDITIS. (Annals of Otology, Rhinology and Laryngology, September, 1915, p. 660.)

A boy, six months old, fell from a table, a distance of three feet, striking his head behind the left ear. He did not become unconscious nor did he vomit. There was no blood from the ear and nothing about the child was noted until the third day, when a swelling developed behind the ear. At this time he had fever and refused his food. The left drum was seen to be bulging and was a deep purple color. On incision, considerable dark blood and mucopurulent material came out. An examination of this discharge showed pneumococci. A simple mastoid operation was performed. On exposing the cortex of the temporal bone a linear fracture was discovered running backward to a necrotic spot just in front of the suture with the mastoid bone. The mastoid cells were filled with detritus and there were granulations on the dura under the necrotic spot. For four days the temperature ran between 100° and 101°. On the tenth day it reached normal, when a septic type of fever began; two blood cultures were negative and the leukocytosis ran about 17,000. Nineteen days after the original operation the wound was opened and the sinus explored. The bone covering the sinus was necrotic and the sinus bathed in pus. The child died sixty hours later. Autopsy was refused. Death was probably due to sinus thrombosis and venous poisoning. S. W. T.

KOPETZKY, S. J.: A CASE OF OTITIS MEDIA AND MASTOIDITIS FOLLOWED BY MENINGITIS; OPERATION; RECOVERY. AFTER EIGHT YEARS' DEVELOPMENT OF CEREBRAL ABSCESS; OPERATION; DEATH. (Annals of Otology, Rhinology and Laryngology, September, 1915, p. 566.)

A boy of fifteen months came under the author's observation on January 16, 1908, suffering from a profound mastoid infection on the right side. Two days afterward he was operated upon, as there was no relief from symptoms, even after the drum was incised. During the next two days coma developed and the classical symptoms of meningitis were noted. On January 20th a decompression operation was done on the temporal bone; the dura was found tense and pulseless; parellel incisions were made through the exposed area and a large amount of clear fluid drained away. Marked improvement resulted and the fluid ceased to flow on the third day. He developed a hernia cerebri, part of which it was never possible to replace, but it granulated over and filled the cavity made at the mastoid operation. The child left the hospital on the 31st in good condition, and the further history was uneventful, except for the loss of conciousness, when its position was suddenly shifted from horizontal to vertical or turned over quickly. This period of unconsciousness lasted but a few seconds. A like phenomena would occur if the child was crying; he would suddenly stop for a few moments, become absolutely quiet and then resume where he left off. If crowing with pleasure, the same thing might happen. This was thought to be due to cerebral adhesions. After six months these periods of unconsciousness were no longer noted.

The child was seen again on February 8, 1915, when he had an acute purulent rhinitis, complained of pains in the head and had a temperature of 105°. Incisions were made in edematous tissue of the aural canals and the discharge gave streptococcus pyogenes. Blood culture was negative. The old operative site was explored and the bony postauricular wall was found to be partly eaten away and when the protruding brain tissue was lifted up a thick, creamy pus, without odor, came away. Cultures from this gave streptococcus mucosus capsulatus. Drainage was established and things looked well for two weeks, when the pulse dropped to 54, the knee-jerk was missed from the opposite knee; the boy complained of severe headache and could not sleep. The headache was frontal, but the frontal sinuses were apparently clear. However, on exploring through the original wound again in a forward direction, between 6 and 8 ounces of pus were evacuated. That evening he had two convulsions and died in the second one.

It is presumed that the second infection invaded the middle ear, and there being no mastoid to infect the brain tissue became involved. S. W. T.

LOUGHRAN, ROBERT L.: A CASE OF MENINGITIS ASSOCIATED WITH ACUTE SUPPURATIVE OTITIS MEDIA, BOTH PRODUCED BY STREPTOCOCCUS MUCOSUS CAPSULATUS. (Annals of Otology, Rhinology and Laryngology, September, 1915, p. 673.)

A boy of ten years was admitted to the hospital on December 24, 1914, complaining of pain in the right ear and discomfort in his stomach. The drum was congested and bulging, but not excessively so. This was incised and a small amount of bloody fluid evacuated. Temperature, 103°. During the next day he complained of headache and his neck was slightly rigid. On the 26th the temperature had risen to 105° and the discharge had become thick and purulent. He had pronounced Babinski and Kernig signs and his blood count showed 22,000 leukocytes, with 91 per cent. polynuclear lymphocytes. A lumbar puncture showed turbid fluid under some tension and smears from this contained the streptococcus mucosus capsulatus in large numbers. A mastoid operation showed no infection there, nor was there infection of the dura about the mastoid region. He was conscious for three days, then passed into delirium and died on the fifth day following the operation. The case is reported as one primarily of acute meningitis in which the symptoms of acute otitis were the first to present themselves. The operation proved that the meninges were not infected through the ear, but the two conditions developed independently. S. W. T.

A CORRECTION

Boston, Mass., March 6, 1916.

Editor Archives of Pediatrics.

Dear Sir: In my article on "The Chemistry of Cow's Milk and Other Products Used in Infant Feeding," which appeared in the January number of Archives of Pediatrics, the table of analysis of proprietary foods was inadvertently taken from the early edition of Holt's book. The corrected table is as follows:

	Nestle's Food.	Mellin's Food.	Eskay's Food.	Malted Milk (Horlick's)	Ridge's Food.	Imperial Granum.	Lacto Preparata.	Carnrick's Food.
	%	%	%	%	%	%	%	%
Fats	4.45	0.24	1.16	8.78	1.11	1.04	12.35	7.45
Proteids	11.47	11.50	5.82	16.35	11.81	14.00	14.51	10.25
Cane Sugar	29.22	......	......	......	......	......	.....	......
Dextrine	6.22	19.20	14.35	18.80	1.28	1.38	......	......
Dextrose	15.95	......	53.46	......	0.52	0.42	......	......
Lactose (Milk Sugar)		......		49.15			63.68	......
Maltose	......	60.80	......		......	......	......	......
Total Soluble Carbohydrates	51.39	80.00	67.81	67.95	1.80	1.80	63.68	27.08
Insoluble Carbohydrates (Starch) ...	28.43	......	21.21	......	76.21	73.54	......	37.37
Inorganic Salts	1.73	3.59	1.30	3.86	0.49	0.39	3.66	4.42
Moisture	2.53	4.73	2.70	3.06	8.58	9.23	5.80	3.42

I should appreciate it if you will insert this correction in the next issue.

Yours very truly,

F. W. Howe.

ARCHIVES OF PEDIATRICS

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ORIGINAL COMMUNICATIONS

STUDIES IN SPINAL FLUID—I

DETERMINATION OF ALKALINITY OF THE SPINAL FLUID, ITS METHOD AND ITS PROBABLE SIGNIFICANCE*†

BY A. LEVINSON, M.D.

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It is a well-known fact that the body fluids are either weakly alkaline or acid. The urine, which contains phosphates and organic acids, has an acid reaction; the blood, which contains minimal amounts of nitrogen basic products, has an alkaline reaction; the stomach contents, which contain hydrochloric and lactic acid, have an acid reaction. A great deal of work has been done on the acidity of the urine, the acidity of the gastric juice, and the alkalinity of the blood, but outside of the assertion that the spinal fluid is alkaline, very little has been done in the way of quantitative determination. We undertook the task of determining the alkalinity of the spinal fluid both out of scientific curiosity and out of the desire to ascertain whether disease exerts any influence upon the alkalinity of the spinal fluid. It seemed to us that the different organisms causing different diseases of the central nervous system should change the reaction of the spinal fluid either by increasing the alkalinity of the fluid or by lessening it, depending on whether the organism is acid-producing or alkaline-producing in nature. The colon bacillus, for instance, changes the medium in which it grows to acid, by fermenting the dextrose present. It is reasonable to suppose, that in a meningitis due to colon bacillus the spinal fluid which contains the organism and contains dextrose should be either acid or at least less alkaline than normal. Furthermore, the meningococcus of Weichselbaum is an acid-producing organism, as has been proven by cultivating it on a Loeffler's serum mixed with dextrose or glucose, to which an indicator has been added. In the acute stage of cerebrospinal fever in the growth of this medium there is a production of a bluish purple color along the tract of the growth. It is plausible to presume, therefore, that the spinal fluid in the acute stage of cerebrospinal meningitis should give a lesser degree of alkalinity than the normal fluid. This possibility we took as the basis of our problem.

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* From the Sarah Morris Hospital for Children and the Nelson Morris Institute for Medical Research (Chicago).

† Read at the Annual Meeting of the Central States Pediatric Society, held October 15, 1915.

The first question that presented itself was that of a method of determination. There are two principal methods by which one can determine the reaction of a fluid.

I. ELECTRICAL DISSOCIATION

If two electrodes of the same metal are placed into solutions containing the ions of the metal in different concentrations, C_1 and C_2 respectively, and these solutions are placed in electrical contact, either through a porous partition or by means of a siphon, or are even separated by gravity alone, then there exists between the two electrodes a difference of potential. This principle can be applied for the determination of the hydrogen ions of concentration (acidity or alkalinity) if for electrodes we use a noble metal like platinum or palladium saturated with hydrogen under a definite pressure. In practice it is more convenient to use a calomel electrode than the normal hydrogen electrode. The use of the electrode in analysis has been known since the days of Wolta, and the test has been elaborated upon by many workers, especially by Bottger and Michaelis.

There is, however, great difficulty in getting accurate results with the hydrogen electrode in the presence of organic compounds. Recently L. H. Desha and S. F. Acres in commenting on the difficulties attending the use of the hydrogen electrode made the following statement: "Some organic compounds are decomposed in the presence of the hydrogen electrode, and especially so when oxygen is present, and the electromotive force observed may not in every case correspond to the concentration of the hydrogen ions present." (American Chemical Journal, Vol. XLVI., p. 628.) Anyone who has attempted to use the hydrogen electrode in organic substances can corroborate the truth of this statement.

II. THE INDICATOR METHOD

The other method for determining the reaction of a body fluid is the indicator method. In 1903 Salesky, while working in Neronst's laboratory, determined by the electrometric method the concentration of hydrogen ions, and the point at which litmus and phenolphthalein change colors. This was the first application of indicators in the determination of acidity. Friedenthal and his pupil, Salm, put the indicator method on a working basis. Then Sorenson went a step further in applying the indicator method to the fluids of the body.

Different salts require different indicators, and it is only by testing them that one can discover which is the right one for the case at hand. For instance, if the solution shows an alkaline reaction when tested with litmus paper phenolphthalein is used, and if the reaction still continues alkaline (pink color) phymophthalein is applied, and so on until the right indicator is found. If the solution is acid to litmus, it is tested with paranitrophenal. If it still remains colorless, methylorange is used, and so the process is continued until the right indicator is discovered. After this has been done, titrations are then made. It may be well to point out that the indicator simply serves to show the titrable alkalinity or acidity and not the absolute. For all purposes, however, it is just the same.

In looking for a method to determine the alkalinity of the spinal fluid we had to adopt the indicator method, since there are organic substances present in the spinal fluid which would interfere with the electrical dissociation.

We started with the common indicators, discarding the ones we could not use as we went along. Phenolphthalein, with which we began, gave a pink color when added to the spinal fluid, proving that the fluid was alkaline, but as the end point was very indefinite we soon discarded it. The insensitiveness of phenolphthalein in this case is easily explained when we consider that it is an acid indicator, and as such does not respond to weak bases. After we had excluded phenolphthalein as an indicator we found reference to one author (Turner) who claimed that at times the spinal fluid was acid in reaction. He used phenolphthalein by adding one or two drops of it to a large amount of spinal fluid. By noting the color produced he judged whether the fluid was acid or alkaline, without, however, titrating against any solution. Besides the inaccuracy of this method, due to lack of quantitative titration, the indicator was not the proper one, for reasons stated, though we do believe that in some diseases the alkalinity will be so decreased that it will be acid to some of the less delicate indicators.

Tincture of cochineal, which we took because of the phosphates present in the spinal fluid, proved to be very insensitive. So also did neutral red. Dimethylamidoazo-benzoin responded to large quantities of spinal fluid, such as 5 c.c., but gave an indefinite reaction to small quantities, such as 1 c.c., which was the amount we desire to use for reasons stated below. Methylorange was better than the above-named indicators and we used it with a fair degree of success for some time, but occasionally we encountered difficulty in obtaining the end point. This can be explained by the fact that the alkalinity of the spinal fluid is due not only to the presence of inorganic substances, but to that of organic as well, to which methylorange is not very sensitive. The change from alkaline to acid with methylorange is slow and presents several shades of color.

We finally found what we believe to be the most sensitive and most suitable indicator for determining the alkalinity of the spinal fluid, and this is methylred. Methylred is one of very few indicators that is sensitive to organic substances. It gives a straw color to water, a strongly yellow color to alkaline and a bright-red to acid. The change from neutral to acid or alkaline is very sharp and can be used even for the determination of ammonia. We used 1 drop of a 2 per cent. solution of methylred in alcohol. We adopted sulphuric acid for titration of the spinal fluid and that in n/100 solution, since it was easy to see that n/10 would give too small a variation in the different fluids. In order to work on a uniform amount at all times we used only 1 c.c. of spinal fluid, this amount always being easily obtainable, while greater amounts such as we desired to use were not always to be had. That we might be able to see the dispersion of the acid drop into the flask we diluted the fluid with 20 c.c. of water although 5 c.c. gave us the same results.

METHOD

We measure 20 c.c. of distilled water in each of three Erlenmeyer flasks, 50 c.c. capacity, all the flasks being of the same height and width. Into each flask we pour 1 drop of a 2 per cent. methylred. This produces a straw-red color, which is the neutral point. We then measure 1 c.c. of the spinal fluid to be examined in a graduated pipette, and pour it into one of the flasks. We titrate this flask with n/100 H_2SO_4 until the neutral point is obtained. This we compare with the other two flasks, all three flasks being placed on a porcelain stand. When the neutral point is reached we take the reading, and then we run in one more drop of the H_2SO_4. A bright-red color appears. In order to check the result we add 1 drop of n/100 NaOH, which changes the color of our solution to straw, and another drop, which changes it to yellow, thus proving that we had not overrun the end point. This method gives us no difficulty in obtaining a sharp end point.

With the method in our hand, we expect to be able to establish a definite standard for the alkalinity of normal spinal fluid. Right now, we can give only some figures with the two different indicators that responded fairly well to our tests:

Name	Age	Diagnosis	Chemical Tests	Other Tests	Alkalinity in terms of n / 100 H_2SO_4		Remarks
					Methyl Red	Methyl Orange	
I. G.	11 yrs.	Epilepsy	Neg.	Neg.	2.2 Cc.	2.8 Cc.	Had epidemic meningitis last year
M. L.	12 yrs.	Typhoid	Neg.	Neg.	2.2	2.4	
E. M.	8 yrs.	Encephalitis (?)	Neg.	Neg.	2.4	2.9	
J. J.	40 yrs.	Lues	Pos.	Wassermann Positive	2.2	....	
R. F.	10 yrs.	Hysteria	Neg.	Neg.	....	2.7	
G. A.	1½ yrs.	Meningismus	Neg.	Neg.	....	2.8	
M. G.	1½ yrs.	Encephalitis	Neg.	Neg.	....	2.7	Hemiplegia
N. J.	4 yrs.	Epilepsy	Neg.	Neg.	....	2.4	
E. W.	6 mos.	Hydrocephalus	Neg.	Neg.	2.0	2.8	
C. L.	18 mos.	Bronchopneumonia	Neg.	Neg.	2.0	2.6	

As can be seen from the few tabulated results, the normal or non-meningitic fluid gave an alkalinity varying between 2.4 and 2.9 c.c. n/100 H_2SO_4 to methylorange and an alkalinity of 2.0 to 2.4 c.c. n/000 H_2SO_4 to methylred. The variation of about half a c.c. n/100 acid is to be expected not only in spinal fluid of different patients, but even in that drawn from the same patient at different times of the day, just as the blood shows different degrees of alkalinity at different periods of the day.

We mentioned the two indicators to show how they compare. We found methylorange to be less sensitive to spinal fluid than methylred. We have no doubt that other workers that have had occasion to use the two will also testify to the greater sensitiveness of methylred.

DIFFERENT DISEASES

Owing to the enormous amount of work entailed in establishing the proper indicator, and because of the comparatively small amount of pathologic material at our disposal, we are unwilling to make strongly positive statements. However, from the data already at hand it seems that the alkalinity of the spinal fluid varies in different diseases. If this proves to be true it will in time be possible to establish an index of alkalinity for different diseases and this may in turn prove to be of some diagnostic value. It may also prove to have some relation to the reducing substance present in normal spinal fluids and which disappears in disease. In course of time we hope to be able to present more accurate data on this subject.

In closing, we wish to thank Mr. Albert K. Epstein, chemist of the Illinois State Food Commission, the attending men and associates of the Sarah Morris Children's Hospital, the internes and nurses, and the pathologist Dr. Kirk, for the valuable assistance they rendered us in our work.

STUDIES IN SPINAL FLUID—II

ALKALINITY OF SPINAL FLUID: REPORT OF A SERIES OF CASES*

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The increase of material at our disposal has demonstrated to us that the alkalinity of the spinal fluid bears a certain relationship to diseases of the meninges. Furthermore, some diseases influence the alkalinity in a characteristic manner. The determination of the chemical reaction of the fluid thus becomes of value in establishing the diagnosis of some forms of meningitis.

In this paper we shall present a report of 50 cases of spinal fluid tested for its alkalinity, some of which were non-meningeal in character, while others were true meningitis. We shall concern ourselves particularly with cases of epidemic meningitis.

The method we employ in determining the alkalinity of the spinal fluid is the one we described in the previous paper. The method in brief is as follows: 1 c.c. of spinal fluid, 20 c.c. of water, 1 drop of a 2 per cent. solution of methyl red, titrated against n/100 sulphuric acid solution, the number of c.c. of H_2SO_4 required to neutralize the fluid being taken as an index.

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* From the Sarah Morris Hospital for Children and the Nelson Morris Institute for Medical Research.

It is most advisable to determine the alkalinity of the fluid as soon after withdrawal as possible, as the reaction changes upon standing, particularly in pathologic cases. We have always endeavored to make our determination immediately after withdrawal, but when this has not been possible we put the tube containing the fluid on ice, tightly corked to exclude air contamination, which is, in itself, a great factor in producing changes in alkalinity. All determinations made after an unavoidable delay we have indicated in our report. Our determinations were made in duplicate in every case.

We shall group our cases according to their character into: (1) Fluids from cases that proved to be non-meningeal. *a*. Adults. *b*. Children. (2) Cases of true meningitis. *a*. Epidemic form. *b*. Other forms.

CASE HISTORIES

GROUP I. (*a*) NON-MENINGEAL FLUID IN ADULTS

CASE I. N. H., adult. Lateral sclerosis of brain. Fluid examined immediately after withdrawal. Other tests negative. Alkalinity, 2.1 c.c.

CASE II. B. L., adult. Cerebral spinal lues. Fluid drawn February 24, 1916. Examined immediately. Cell count, 10. Differential, 100 per cent. lymphocytes. Chemical tests negative. Alkalinity, 1.8 c.c.

CASE III. N. H., adult. State Hospital. Diagnosis, insanity. Spinal fluid drawn December 21, 1915. Examined December 22, 1915. Bottle tightly corked. Wassermann negative. Other tests negative. Alkalinity, 1.9 c.c.

CASE IV. P. H., adult. State Psychopathic Hospital. Diagnosis, insanity. Fluid drawn January 24, 1916. Examined January 25, 1916. Fluid clear. Other examinations negative. Alkalinity, 2 c.c.

CASE V. A. S., adult. Nephritis. Fluid drawn November 29, 1915. Examined November 30, 1915. Chemical tests negative. Alkalinity, 2.2 c.c.

CASE VI. M. R., adult. Brain tumor. Wassermann and Lange negative. Alkalinity, 1.75 c.c.

CASE VII. J. B. Insanity. State Psychopathic Institute.

Fluid drawn December 21, 1915. Examined December 23, 1915. Corked; kept on ice. Wassermann negative. Alkalinity, 2.1 c.c.

CASE VIII. J. S. Tabes. Alkalinity, 2 c.c.

CASE IX. H. Wassermann positive. Cell count, 7. Differential, 100 per cent. lymphocytes. Chemical tests: Noguchi positive. Alkalinity, 2.5 c.c.

CASE X. D., State Hospital. Diagnosis, insanity. Fluid examined January 25, 1916. Alkalinity, 2 c.c.

CASE XI. P., adult. Wassermann positive. Fluid drawn January 4, 1916. Examined January 5, 1916. Alkalinity, 2.25 c.c. H_2SO_4. Duplicate, 2.2 c.c.

CASE XII. C. W., adult. State Psychopathic Institute. Wassermann positive. Fluid drawn December 21, 1915. Examined December 23, 1915. Tube corked. Alkalinity, 2 c.c.

CASE XIII. A., adult. Diagnosis, insanity. Wassermann positive. Fluid drawn January 4, 1916. Examined January 5, 1916. Alkalinity, 2.2 c.c.

CASE XIV. J. J., age forty years. Diagnosis, lues. Alkalinity, 2.1 c.c.

CASE XV. A. R. Diagnosis, multiple sclerosis of brain. Fluid drawn November 29, 1915. Examined November 30, 1915. Chemical tests negative. Noguchi slightly positive. 19 cells, 2 polynuclears, 17 lymphocytes. Alkalinity, 2.25 c.c.

CASE XVI. W. P. State Psychopathic Hospital. Diagnosis, insanity. Wassermann positive. Fluid examined day after withdrawal. Alkalinity, 1.85 c.c.

CASE XVII. A. C. State Psychopathic Hospital. Wassermann positive. Fluid drawn January 4, 1916. Examined January 5, 1916. Alkalinity, 2.2 c.c.

CASE XVIII. P. G. State Psychopathic Hospital. Wassermann positive. Fluid drawn January 23, 1916. Examined January 25, 1916. Alkalinity, 1.55 c.c.

(*b*) NON-MENINGEAL FLUID IN CHILDREN

CASE I. E. A., age two years. Diagnosis, convulsions. Fluid drawn October 22, 1915. Examined three hours later. Noguchi, Ross Jones, Nonne negative. Alkalinity, 1.7 c.c. n/100 H_2SO_4.

CASE II. D. C., age thirteen months. Convulsions. Spinal puncture January 13, 1916. Examined next morning. Chemical test negative. Left ear paracentesis February 21, 1916. Temperature dropped. Alkalinity of fluid, 1.7 c.c.

CASE III. A. M., age eleven months. Otitis media, pneumonia. Alkalinity, 1.5 c.c. Duplicate, 1.6 c.c.

CASE IV. J. C., age five and one-half months. Came in with meningeal symptoms; proved to be erysipelas. Chemical test negative. Alkalinity, 1.9 c.c.

CASE V. J. H., age seventeen months. Anterior polyomyelitis. Spinal fluid drawn January 19, 1916; clear. Examined one hour later. Chemical test negative. Alkalinity, 1.85 c.c. Duplicate, 1.8 c.c.

CASE VI. B. M. Spinal fluid drawn February 22, 1916. Examined February 23, 1916; 20 c.c. clear spinal fluid. Cell count, 6. Differential, 100 per cent. lymphocytes. Chemical tests negative. Alkalinity, 1.8 c.c.

CASE VII. B. C. Diagnosis, meningismus. Fluid drawn February 9, 1916. Examined February 10, 1916. Fluid clear. Alkalinity, 1.5 c.c.

CASE VIII. H. T., age five and one-half years. Cerebellar tumor. Convulsions started suddenly December 26, 1915. Fluid drawn February 9, 1916, P.M. Examined February 10, 1916, A.M. Fluid clear. Direct cell count, 6 per cm.m. Differential, 100 per cent. lymphocytes. Direct smear negative. Chemical tests negative. Decompression done February 11, 1916. Alkalinity, 1.9 c.c.

CASE IX. S. G., ten months. Bronchitis (bronchopneumonia)? Spinal puncture November 26, 1915, A.M. Fluid clear. Wassermann negative. Chemical tests negative. Alkalinity, 1.85 c.c. H_2SO_4. Puncture December 17, 1915, P.M. Examined December 18, 1915, A.M. Alkalinity, 1.75 c.c. Puncture January 3, 1916. Bronchopneumonia. Otitis-meningeal symptoms. Fluid clear. Alkalinity, 1.8 c.c.

CASE X. R. W. Came in with cough, fever and some rigidity of neck. Spinal fluid drawn January 17, 1916. Examined January 18, 1916. All tests negative. Alkalinity 1.8 c.c.

CASE XI. A. T. Came in with typical symptoms of meningitis; proved to be pneumonia. Fluid examined March 23, 1916. Alkalinity, 1.6 c.c.

CASE XII. I. G., eleven years. Epilepsy. Fluid drawn October 21, 1915. Examined same day. All tests negative. Alkalinity, 2.2 c.c.

CASE XIII. E. M. Encephalitis. Fluid drawn October 10, 1915. Alkalinity, 2.4 c.c.

The following 2 cases showed an unusually high alkalinity, which we account for on the ground that the patients had been getting repeated doses of sodium bicarbonate.

CASE I. M. G., adult. Uremia. Fluid drawn November 18, 1915. Examined November 19, 1915. Alkalinity, 2.6 c.c. H_2SO_4.

CASE II. G. T., child. Pneumonia; patient comatose. Fluid drawn March 9, 1916. Examined immediately. Alkalinity, 2.5 c.c.

An analysis of the above cases will show that the alkalinity of the spinal fluid in non-meningeal cases varies from 1.5 to 2.6 c.c. We made the differentiation between fluids drawn from adults and those drawn from children to show the difference in the degree of alkalinity, adults, as a rule, showing a much higher percentage than children. Of the 19 cases of adults cited, only 1 gave an alkalinity as low as 1.55 c.c., the rest ranging 1.8 and higher; whereas, of the 13 cases of children whose diseases were non-meningeal in character, most of them ranged from 1.6 to 1.9 c.c. in alkalinity. It may be plausible to suppose that the lower alkalinity in children may have been due to the fact that the fluids drawn from the children were, for the most part, taken from cases with a high temperature, many being pneumococcic in origin. It is a well-known fact that the pneumococcus slowly changes the medium in which it grows into acid, and this very likely exerts an influence on the spinal fluid as well. This, however, is a matter of mere speculation.

Of special interest are the 2 last cases quoted, in 1 of which the alkalinity was 2.55 and the other 2.6 c.c., the highest degree of alkalinity we found in the spinal fluid we examined. The one case, that of a patient who was uremic, we learned, had received subcutaneous injections of sodium bicarbonate. This probably changed the spinal fluid as well as all other secretions of the body into strongly alkaline. The same thing had been done to the second case, which was that of a pneumonia resembling meningitis. Great quantities of sodium bicarbonate had been administered. Although we had made no previous examinations to ascertain whether the fluid had been less alkaline before the injections of the sodium solution, we believe it is logical to assume that the sodium was responsible for the high alkalinity of the fluid.

On the basis of the above findings we feel safe in stating that the alkalinity of the spinal fluid in cases where the meninges are unaffected, ranges in adults from 1.5 to 2.25 c.c. and in children from between 1.5 and 1.9 c.c. As a general rule, then, in cases that are non-meningeal in character, we would call an alkalinity of fluid normal when it ranges between 1.5 and 2.6 c.c., thus allowing for wide variations of age, time of day and other factors that might enter into account.

GROUP II. CASES OF TRUE MENINGITIS

(*a*) MENINGOCOCCIC VARIETY

Owing to the fact that these cases are to illustrate several important points in this paper, we shall bring the case histories in full.

CASE I. W. O., admitted December 12, 1915, age eleven years. Present trouble of two weeks' duration, with cold in head, seemed better, but on December 10th complained of severe frontal headache, pain in left hip and precordium. Same day had severe chill, with subsequent pain in back and neck. December 11th, became unconscious and delirious. December 12th, slight convulsions followed by small amount of vomiting immediately after. Bowels regular to December 10th. Past history, morbilli, 1915. Family history, negative. Physical examination December 12, 1915. Marked rigidity of neck, pupils unequal, but react. Thorax, negative. Abdomen, scaphoid. Kernig's very marked. Brudzinsky and Babinsky positive. Spinal puncture December 12, 1915, 7 P.M.; turbid fluid; 15 c.c. of serum administered. December 13, 1915, 20 c.c. of turbid fluid withdrawn; 30 c.c. of serum injected; fluid somewhat clearer than December 12, 1915. December 14, 1915, 9 A.M., 10 c.c. of fluid; thick, very cloudy; 15 c.c. of serum injected. 8 P.M., 20 c.c. of very cloudy fluid and 15 c.c. serum injected.

December 15, 1915, only few c.c. of thick, yellowish fluid obtained. December 16, 1915, exitus. Blood: White blood cells, 35,350; neutrophile, 88 per cent.; small mononuclear, 10 per cent.; large mononuclear, 2 per cent. *Spinal fluid,* December 12, 1915, 25 c.c. turbid, under marked pressure. Cell count, 41,200; 100 per cent. polymorphonuclears. Chemical tests positive. Meningococcus in direct smear and culture. *Alkalinity,* 0.9 c.c. n/100 H_2SO_4.

CASE II. E. S., ten years. Admitted December 31, 1915. Was struck on head December 30th, walked home, washed off blood, and then started complaining of headache. Vomited, December 31, 1915, after eating; later became unconscious. Constipated since injury. Past history, morbilli, otherwise negative. Physical examination: Abrasion of scalp, size of dime; slight impairment of resonance left upper lung anteriorly with roughened breathing; all signs of meningitis positive. Spinal puncture December 31, 1915, 8:45 P.M., cloudy fluid under pressure, showing gram negative intracellular diplococci. 11:30 P.M., 30 c.c. spinal fluid, very cloudy; 30 c.c. anti-meningococcus serum injected. Temperature when admitted, 104°; pulse, 104; respiration, 28. After spinal puncture, temperature, 102°; pulse, 128; respiration, 30. Patient died January 31, 1916. *Spinal fluid,* December 31, 1915: Cell count, 2,400; differential, 99 per cent. polymorphonuclears; 1 per cent. lymphocytes; direct smear, meningococcus. Chemical tests positive. Culture pure meningococcus. *Alkalinity,* .9 c.c. n/100 H_2SO_4.

CASE III. E. S., age four years. Admitted March 7, 1916. Personal history, negative. Present trouble, headache and chill, fever, stiffness of head, opisthotonus, delirium, loss of speech, vomiting, loss of appetite and constipation. Onset, March 5th, marked chill. Vomiting projectile in character. Past history, negative. Family history: Father has syphilis (contracted recently) and gonorrhea. Physical examination: Well developed, marked rigidity, head drawn back, irregular pupils and high temperature; marked opisthotonus; cheeks flushed; eyes sunken; right pupil larger than left, but react; veins of neck distended. Thorax, negative. Abdomen, rigid. Extremities: Thighs flexed on abdomen. Reflexes: Positive Kernig's and Brudzinsky. Temperature on admission, 104°; pulse irregular, 140. Spinal puncture: 20 c.c. of turbid fluid withdrawn under pressure;

20 c.c. of serum injected. March 8, 1916, spinal puncture, 9 A.M. Cultures show meningococcus. 8 P.M., 30 c.c. turbid fluid removed, 30 c.c. serum injected. March 9, 1916, 10 A.M., 30 c.c. turbid fluid; 30 c.c. serum injected. 3 P.M., child began to talk; asked for water and objected to interne's visit. March 11, 1916, temperature down to 99.8°; rigidity becoming less; child is now able to lie flat on back. March 12, 1916, forty-eight hour culture showed meningococcus. March 15, 1916, extremities and most of trunk covered with urticarial rash. March 15, 1916, to March 21, 1916, temperature normal. March 21, 1916, discharged cured. Spinal fluid, March 7, 1916: Direct cell count thousands of pus cells; 95 per cent. polymorphonuclears, 5 per cent. lymphocytes. Direct smear, meningococcus. Globulin tests positive. Cultures, meningococcus. *Alkalinity*, .7 c.c. n/100 H_2SO_4.

CASE IV. M. H., admitted January 17, 1916. History, cold for one week. January 17, 1916, a friend noticed little flighty spells, her eyes staring and head thrown back. Spell was momentary. Physical examination: Well-developed; apathetic; neck slightly rigid; chest negative; no Kernig's. Temperature on admission, 104°; pulse, 120; respiration, 40. Patient delirious. Spinal puncture: 30 c.c. turbid fluid obtained under increased pressure; 30 c.c. of antimeningococcus serum given; patient became quiet. 11:30 same day, 5 c.c. of fluid obtained. January 18, 1916, temperature, 101°, 102°, 101.6°; pulse, 100, 104, 88; respiration, 40, 22 and 22. Spinal puncture: 9 A.M., 30 c.c. turbid fluid removed; 30 c.c. of serum injected. Patient complains of severe headache, cries with pain, very restless. 7 P.M., 30 c.c. fluid removed and 30 c.c. of serum injected. January 9, 1916, 9 A.M., 30 c.c. fluid removed and 30 c.c. serum injected. Temperature, 102°, 101°, 102°; pulse, 108, 116, 104; respiration, 32, 28, 32. 4:50 P.M., 30 c.c. of serum given. January 20, 1916, 30 c.c. serum administered. 4:30 P.M. same day, unable to inject serum into canal, so injected 8 c.c. subcutaneously and 5c.c. intravenously. 7 P.M., 10c.c. intravenously. January 21, 1916, 30 c.c. serum intravenously at 10 A.M.; 15 c.c. at 10 P.M. January 22, 1916, 15 c.c. intravenously given A.M. and P.M. January 23, 1916, marked herpes over lips, forehead and both sides of hard palate; 15 c.c. of serum intravenously. Up to this time 270 c.c. given—157 intraspinously, 8 c.c. subcutaneously, 105 intravenously. January 24, 1916, 15 c.c. intravenously; 8 A.M., 15 c.c.

and at 8 P.M. January 25, 1916, 15 c.c. intravenously; herpes slowly drying up; Kernig's less marked; motion of neck greatly increased. January 31, 1916, patient's face red and indurated; temperature, 104°; pulse, 128; respiration, 34; olive oil applied to lower extremities; hot boric acid to elbow; ichthyol ointment to face. February 2, 1916, temperature down to 99°. February 17, 1916, patient discharged well. Blood: White blood cells, January 17, 1916, 28,000; January 18, 1916, 28,000; January 22, 1916, 18,000; January 27, 1916, 17,000. Differential, neutrophile, 90 and 80. Spinal fluid, January 17, 1916: Direct cell count, 2,400. Differential, 90 per cent. polymorphonuclears. Globulin, positive. Direct smear, meningococcus. Culture negative. Wassermann negative. Alkalinity, 0.9 c.c. n/100 H_2SO_4.

CASE V.: M. K., age eleven months. Breast-fed. Admitted February 1, 1916. Present history: Sudden onset four days ago; vomiting; fever; convulsions. Since then stuporous condition. Past history, negative. Family history, negative. Physical examination: No stiffness of neck; slightly impaired resonance over left lower; roughened breath sounds same area. Reflexes, brisk. Diagnosis, bronchitis. Left ear, membrane slightly reddened. February 5, 1916, patient spastic; neck stiff; no Kernig's. February 9, 1916, 15 c.c. of spinal fluid obtained; smear shows meningococcus. February 9, 1916, 6:30 P.M., 15 c.c. of serum administered. February 10, 1916, 10 c.c. of bloody fluid; 10 c.c. of serum injected. February 11, 1916, 15 c.c. of fluid; 15 c.c. of serum; direct smear shows meningococcus; culture, meningococcus. February 13, 1916, 15 c.c. of fluid; 15 c.c. of serum. February 20, 1916, patient discharged in good condition. *Spinal fluid,* February 9, 1916: Globulin test positive; meningococcus. *Alkalinity* (examined February 10, 1916), 1.3 c.c.

CASE VI. E. C. Case at dispensary department University of Illinois Medical School. January 26, 1916, had a cold for few days; improved; taken suddenly with convulsions; unconscious. Spinal puncture: 30 c.c. cloudy fluid removed under greatly increased pressure. Cell count, 75,000 per cm.m.; 90 per cent. polymorphonuclears. Culture, meningococcus. Alkalinity (examined January 27, 1916, uncorked), 1.1 c.c. H_2SO_4. Patient recovered on serum treatment.

CASE VII. J. H. Epidemic meningitis. Fluid drawn March 8, 1916. Examined March 9, 1916. Alkalinity, 1.3 c.c.

CASE VIII. D. S., age six years. Admitted January 25, 1916. Onset January 18, 1916, with fever, headache, irritation and constipation. On January 25, 1916, noticed he could not flex legs. Past history, measles. Family history, negative. Physical examination: Anxious facial expression; stiffness of neck; distinct Kernig's; suggestive Brudzinsky. January 25, 1916, spinal puncture: 25 c.c. of clear fluid under pressure; meningococci found. January 26, 1916, serum injected; child gradually getting worse; exitus. *Spinal fluid:* Cell count, 160 per cm.; 70 per cent. polymorphonuclears. Chemical test positive. Meningococcus found. Alkalinity (examined January 28, 1916, two days after withdrawal), 1.2 c.c.

From the above cases it is evident that epidemic meningitis shows a lessened alkalinity of the spinal fluid. Of the 8 cases cited above none reached to 1.5 c.c., the lowest limit we put for non-meningeal cases. Two of the 8 showed an index of 1.3 c.c.; 1 1.2 c.c., and 1 1.1 c.c., while 3 showed only 0.9 c.c. and 1 even as low as 0.7. The results are quite striking when considering that one of the fluids that gave an index of 0.9 was from an adult affected with meningitis; and that all of the cases of higher alkalinity (1.1 c.c., 1.2 c.c., 1.3 c.c.) were fluids that have been examined one day after being withdrawn from the body. It is worth while to note that while alkalinity was decreased the fluid still remained alkaline (and not acid) in every case of meningitis.

(*b*) OTHER FORMS OF MENINGITIS

CASE I. E. S. Pneumococcic meningitis; fatal case. Spinal fluid examined October 12, 1915, one day after withdrawal from body. Chemical tests positive. Pneumococci in culture. Alkalinity, 1.1 c.c.

CASE II. E. M. Pneumococcic meningitis. Chemical tests positive. Fluid drawn April 10, 1915. Alkalinity, 1 c.c. Fluid drawn April 17, 1915. Patient in critical condition. Alkalinity, .9 c.c.

CASE III. J. P., age three years. Tuberculous meningitis. Spinal fluid drawn October 5, 1915. Chemical tests positive. Alkalinity, 1.8 c.c. Fluid drawn October 6, 1915. Tubercle bacilli found. Alkalinity, 1.9 c.c.

CASE IV. A. M., age twenty months. Tuberculous meningitis. Onset November 18, 1915; gradually. Fluid drawn November 22, 1915; clear. Chemical tests positive. Alkalinity, 2 c.c. Fluid drawn November 26, 1915; clear. All chemical tests positive. Alkalinity, 2.1 c.c.

Case V. M. L. Tuberculous meningitis. Fluid drawn January 3, 1916. Chemical tests positive. Alkalinity, 2 c.c.

Case VI. I. W., age seven. Tuberculous meningitis. Fluid drawn March 21, 1916. Chemical tests positive. Alkalinity, 1.8 c.c.

Case VII. L. W. Tuberculous meningitis (diagnosis not certain). Fluid drawn March 25, 1916. Alkalinity, 2 c.c.

Case VIII. M. E. Influenza meningitis. Fluid drawn January 27, 1916. Chemical tests positive. Alkalinity, 1.45 c.c.

The above cases seem to indicate that pneumococcic meningitis shows a lessened alkalinity and that tuberculous meningitis shows no decrease in alkalinity.

Of puzzling nature was one of the cases of our series:

L. G., age four months. Was at hospital for circumcision, and discharged in good condition. Returned to hospital four days later with temperature of 102° . No findings. Child gradually sunk into deep coma with cyanosis and Cheyne-Stokes breathing. Spinal fluid drawn January 13, 1916; examined immediately after. All tests negative. Alkalinity, 0.6 c.c.; repeated determination gave same result. Whether this was a case of "acidosis" or of some form of meningitis in the early stage we could not say, the relatives having denied us the privilege of posting the child. This is the lowest alkalinity we obtained in any case.

EFFECT OF SERUM UPON THE ALKALINITY

As could be expected, the administration of serum had an increasing effect upon the alkalinity of the spinal fluid. The following cases may serve as illustration:

Case I. E. S. Epidemic meningitis (referred to above). Fluid drawn March 7, 1916 (before administration of serum). Alkalinity, 0.7 c.c. Fluid drawn March 8, 1916. Alkalinity, 1.2 c.c., an increase of 0.5 c.c. n/100 N_2SO_4. Fluid drawn March 9, 1916. Alkalinity, 1.5 c.c., an increase of 0.8 c.c. compared to the first.

CASE II. J. R. Fluid drawn January 12, 1916, after first serum administration. Alkalinity, 1.5 c.c. Fluid drawn January 14, 1916, after second administration of serum. Alkalinity, 2.1 c.c. Fluid drawn January 14, 1916, after third administration of serum. Alkalinity, 2.4 c.c.

CASE III. W. O. Fluid drawn December 12, 1915. Alkalinity, 0.9 c.c. Fluid drawn December 13, 1915, after administration of serums. Alkalinity, 1.5 c.c. Fluid drawn December 14, 1915, after third administration of serum. Alkalinity, 2 c.c.

RELATION OF ALKALINITY TO DEXTROSE

Does the alkalinity of the fluid bear a direct relationship to dextrose, and does the lessened alkalinity in epidemic meningitis depend on the absence of dextrose in the fluid? While this is going to be made a special point of study (to be published by Dr. Strouse and the author), we shall mention here only a number of cases to show the point in question.

While most cases of meningitis showed an absence of sugar, some showed the presence of sugar in spite of low alkalinity. For instance, Case D. S., referred to above, showed an alkalinity of 1.2 c.c. and still showed dextrose in the amount of 0.08 per cent., and Case E. S., that showed an alkalinity of only 0.7 c.c., the lowest alkalinity obtained in meningitis, still showed dextrose to the amount of 0.08 per cent., which is a normal amount. On the other hand, some cases that showed a high alkalinity showed an absence of sugar, so did J. P., a case of tuberculous meningitis, give an alkalinity of 1.7 c.c. and an absence of sugar, and A. M., a case of tuberculous meningitis, gave an alkalinity of 2 c.c. and an absence of sugar. This makes us believe that while there may be some relationship between the two, one is not dependent upon the other. We would like to call attention to the hypothesis that possibly amino acids may be responsible for the lessened alkalinity. We expect to make this hypothesis of ours a special point of investigation.

CHANGE OF ALKALINITY UPON STANDING

In order to determine the change in alkalinity going on in the fluid after it has been removed from the body, different portions of the same specimen of spinal fluid were put away in the ice-box, some being plugged with cotton, others with ordinary cork. As was natural to expect, those fluids exposed to air increased their alkalinity in a short time. Of the fluids contained in corked tubes some showed a marked increase in alkalinity, others hardly showed any increase. Pathologic fluids always showed an increased alkalinity upon standing.

The following will serve as illustrations:

J. H. Anterior poliomyelitis. Examination January 19, 1916, same day. Alkalinity, 1.8 c.c. Examination March 14, 1916. Alkalinity, 1.8 c.c.; no increase.

R. W. Bronchitis. Fluid drawn January 17, 1916. Alkalinity, 1.8 c.c. Examination March 14, 1916. Alkalinity, 1.75 c.c.; no increase.

M. E. Tuberculous meningitis. Fluid drawn, February 2, 1916. Alkalinity, 1.65 c.c. Examination March 14, 1916. Alkalinity, 1.8 c.c.; slight increase.

J. R. Fluid drawn January 12, 1916. Alkalinity, 1.6 c.c. Examination March 14, 1916. Alkalinity, 1.4 c.c.; decreased.

D. S. Epidemic meningitis. Fluid drawn January 12, 1916. Alkalinity, 1.2 c.c. Examination March 4, 1916. Alkalinity, 1.5 c.c. Examination April 1, 1916. Alkalinity, 1.6 c.c.; increase of .4 c.c. in two and one-half months.

M. L. Tuberculous meningitis. Fluid drawn January 3, 1916. Alkalinity, 2 c.c. Examination March 4, 1916. Alkalinity, 2.8 c.c.; increase of .8 c.c. in one month.

G. T. Pneumonia. Fluid drawn March 9, 1916. Alkalinity, 2.5 c.c. Examination April 1, 1916. Alkalinity, 2.75 c.c.

H. T. Cerebellar tumor. Fluid drawn February 9, 1916. Alkalinity, 1.9 c.c. Examination April 1, 1916. Alkalinity, 2.2 c.c.; increase of .3 c.c.

B. L. Cerebrospinal lues. Fluid drawn February 24, 1916. Alkalinity, 1.8 c.c. Examination April 1, 1916. Alkalinity, 2.1 c.c.; increase of .3 c.c.

SUMMARY

(1) Spinal fluid is alkaline normally and remains so even in the most pathologic cases.

(2) The alkalinity in non-meningeal cases varies between 1.5 c.c. to 2.6 c.c. of n/100 H_2SO_4, using methyl-red as indicator.

(3) The alkalinity is greatly lessened in epidemic meningitis, ranging between 0.7 c.c. and 1.3 c.c. It is seemingly also decreased in pneumococcic meningitis, while it is not decreased in tuberculous meningitis. This would make the lessened alkalinity of diagnostic importance, in that it would indicate a meningococcic or pneumococcic meningitis.

(4) The lessened alkalinity bears no direct relationship to the dextrose of the spinal fluid.

(5) Administration of serum increases the alkalinity.

30 North Michigan Boulevard.

TECHNIC OF DIAGNOSTIC BLOOD REMOVAL AND INTRAVENOUS INJECTIONS IN INFANTS—L. Tobler (Monatsschr. f. Kinderheil., Bd. XIII., Nr. 8, 1915) says that the newer methods of diagnosis by means of blood tests require several centimeters of blood, more than can be obtained by a simple prick of the finger. In children, on account of the thickness of the subcutaneous fat and the small size of the vessels, it is difficult to obtain the requisite quantity of blood without the appearance of brutality, which is objected to by the parents. Various methods have been used for collecting the blood, such as causing hyperemia in the portion to be pricked, but all have proven unsatisfactory. The external veins of the head and the jugular veins have been suggested for the collection of the blood. The author recommends instead the use of the longitudinal sinus for this purpose. This has a large caliber, its walls are thick and do not collapse, and are easily punctured through the anterior fontanel as long as that remains open. Its position is absolutely constant, and it is not easy to pierce the opposite wall of the sinus when introducing the needle. The author made a number of observations on the dead body, inserting the needle into the fontanel and injecting materials of various kinds. Blood was aspirated in dying children also. No macroscopic or microscopic lesions of the inner vessel walls were found. Puncture had been made in fifty living children. Cerebrospinal fluid has never appeared, no bad effects have been seen from the withdrawal of several centimeters of blood, and the blood has been absolutely sterile.—*American Journal of Obstetrics.*

SOME IMPORTANT FACTORS AFFECTING THE INCIDENCE OF MEASLES AND THE FATALITY THEREFROM *

BY J. G. WILSON, M.D.

Assistant Surgeon, U. S. Public Health Service

Statements as to the mortality of measles show a great difference of opinion among different authors. Thus Holt, in his "Diseases of Infancy and Childhood," places the general mortality at from 4 per cent. to 6 per cent., and that of institutions at from 10 per cent. to 35 per cent.[1] A study of the vital statistics of the various cities and states in the United States shows that the general mortality at the present time is not nearly so high as it was when Holt made this statement. In 1913 in the city of New York, the fatality rate per 100 cases was only 2.15, and even this was higher than that of any other city with a population of 500,000 or over. In 1914 there were 170,004 cases of measles reported to the health authorities in twenty-eight states and territories; 2,905 of these died, giving a case mortality of 1.73 per cent.[2] It would seem that we are well within the limits of conservatism if we place the present case mortality rate of measles throughout the United States at less than 2 per cent. However, we are now at the low-water mark of measles mortality. This is indicated by a comparison of the vital statistics of the past two years with those presented by Frederick S. Crum, Assistant Statistician for the Prudential Life Insurance Company, in a paper read before the American Public Health Association in 1913. His figures showed a much higher death rate from measles in the United States than has prevailed since the presentation of his article. At that time he said, "The most reliable international mortality statistics show that on an average, in the countries of the temperate zones, more than 1 per cent. of all deaths are caused by measles. In the registration area of the United States the percentage which measles contributed to the total mortality during 1906 to 1910 was 0.71. During 1900 to 1911, 50,000 deaths were recorded from measles in the registration area of the United States."[3]

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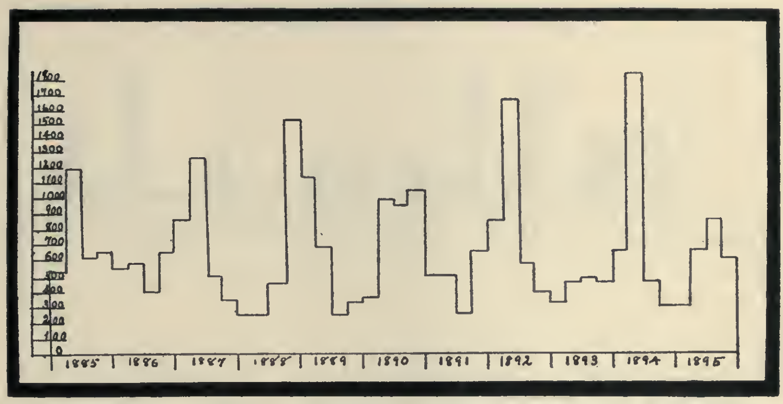
* Read at the New York Academy of Medicine, Section on Pediatrics, February 10, 1916.

The mortality from measles is almost uniformly higher in institutions than in private practice. The following figures are taken from Nothnagel's "Encyclopedia of Practical Medicine," and are given on the authority of Northrup and von Jürgensen: In 1897, 258 cases at the New York Foundling Hospital gave a case mortality of 13.9 per cent. The Charité Hospital, a German institution, yielded a mortality of 30.3 per cent. out of a total of 294 cases between 1888 and 1890, while 453 cases at Friedrichsain from 1886 to 1890 gave a mortality of 22.6 per cent. I cannot imagine any more unfavorable conditions for recovery from measles than to be taken sick in the steerage in transit to the United States, and then, either in the height of the disease or before convalescence is well established, to be transported in overcrowded barges from the New York City docks to the Immigrant Station at Ellis Island. Besides the unfavorable sanitary conditions necessarily surrounding this procedure, the patient has almost invariably been exposed to the risk of cross infection before he reaches the hospital. Notwithstanding these facts, the case mortality of measles at the Contagious Disease Hospital at Ellis Island has averaged less than 10 per cent. from the time the hospital was opened, in 1911, until the outbreak of the European war. After that event, in the late summer of 1914, measles practically ceased for over a year, but recently the steerage from Rotterdam and Falmouth has been bringing the disease again, and in 12.5 per cent. of the cases it has been complicated with some cross infection before admission to hospital. But in spite of these unfavorable conditions the mortality is the lowest we have ever had, being 8.5 per cent. of the cases admitted for the past three months.

I think this cursory mention of a few statistical facts is sufficient to show why authorities differ so greatly in their statements as to the average mortality of measles. It is quite evident that the disease has no fixed mortality rate even when immense numbers are used as a basis of calculation. There is probably some as yet undetermined factor, entirely apart from age and unfavorable surroundings, which enters into the situation and makes the disease now a mild one with easy recovery and now a virulent one with a high incidence of complications and death. That some undetermined factor is at work is shown not alone in its variable mortality rate, but also in its incidence rate. Paul Th. Müller, in speaking of the periodicity of measles epidemics,

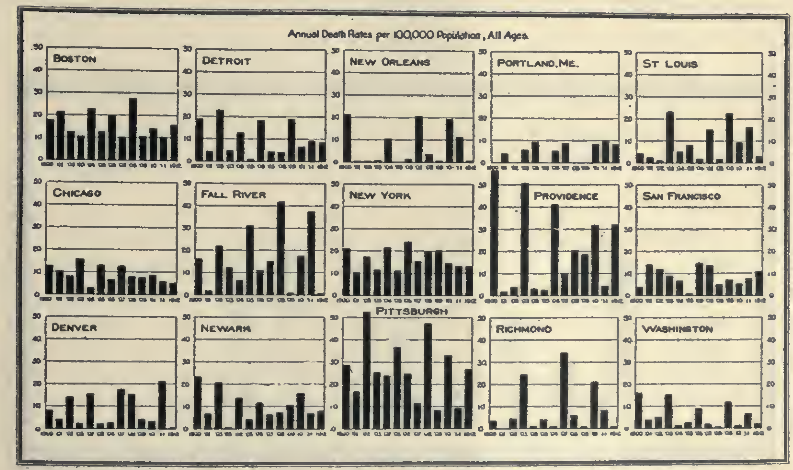
CHART NO. 1



Curve showing the periodicity of measles epidemics as illustrated by the combined table of measles morbidity in 14 European cities.—Paul Th. Muller

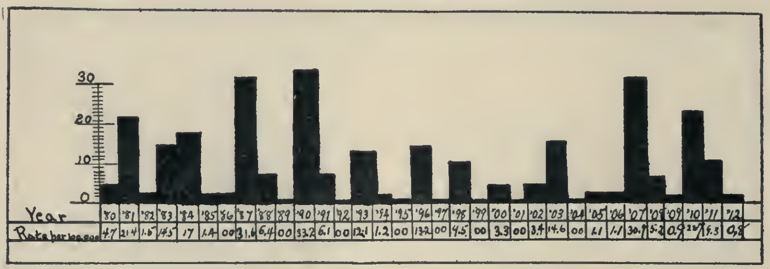
cites Gottstein's investigations of this subject in fourteen European cities (among which were London, Paris, Berlin and Stockholm) as tending to establish the view that periodic epidemic outbreaks tended to recur at three to five year intervals. The incidence of measles cases as thus investigated by Gottstein cover a period of eleven years.[4] The regularity of the recurrence of the epidemics is graphically illustrated in Chart No. 1. In this country the periodicity of measles outbreaks has often been noted. Chart No. 2 (published by the Prudential Life In-

CHART NO. 2



Periodicity of measles epidemics—Fifteen representative American cities

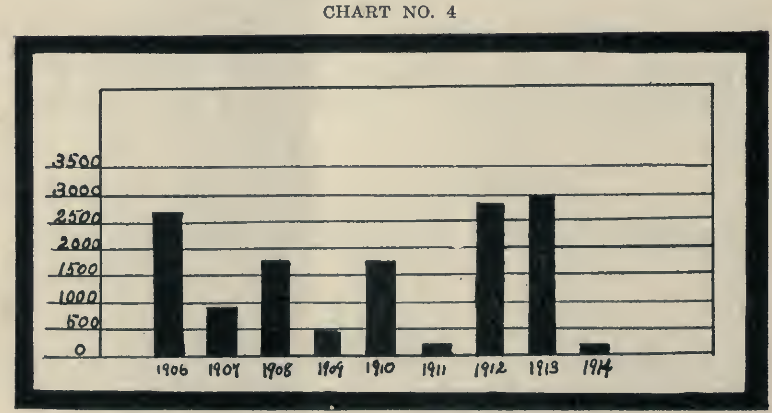
CHART NO. 3



Annual death rate from measles per 100,000 population in the city of Richmond, Virginia—1880-1912.—Dr. E. C. Levy

surance Company) shows a graphic compilation of the periodicity of measles epidemics in fifteen American cities. Levy, of the Health Department of Richmond, Va., studied the death rate from measles in that city for a period of thirty years and noted a periodicity in the virulence of the outbreaks which led him to successfully predict almost the exact mortality for three successive years. (Chart No. 3.) Although Levy's tables have more to do with the virulence of the epidemic than the number of cases, an examination of his reports shows that, as a rule, those years with a very low case fatality were those of a low incidence of the infection, and thus his figures go to establish the view that an interval of at least two years occurs between severe measles epidemics in the city of Richmond.[5] In New York City the periodicity has been marked, but the time interval has been less than in most other cities. From 1873 to

CHART NO. 4

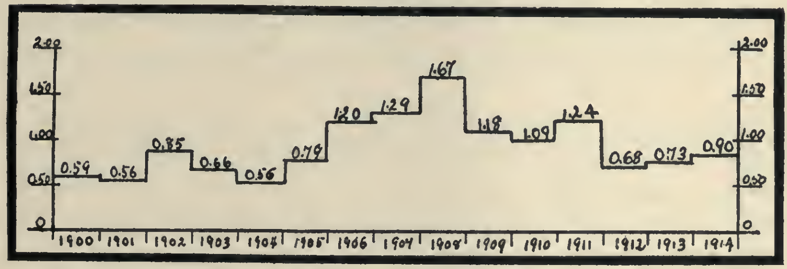


Number of cases of measles reported in Cincinnati—1906-1914

1903 measles recurred in regular two-year waves—one year of epidemic followed by an off year. There were only two exceptions to this biannual periodicity in the whole thirty years.[9] In Cincinnati the general tendency has been to every other year epidemics similar to New York. (Chart No. 4.)

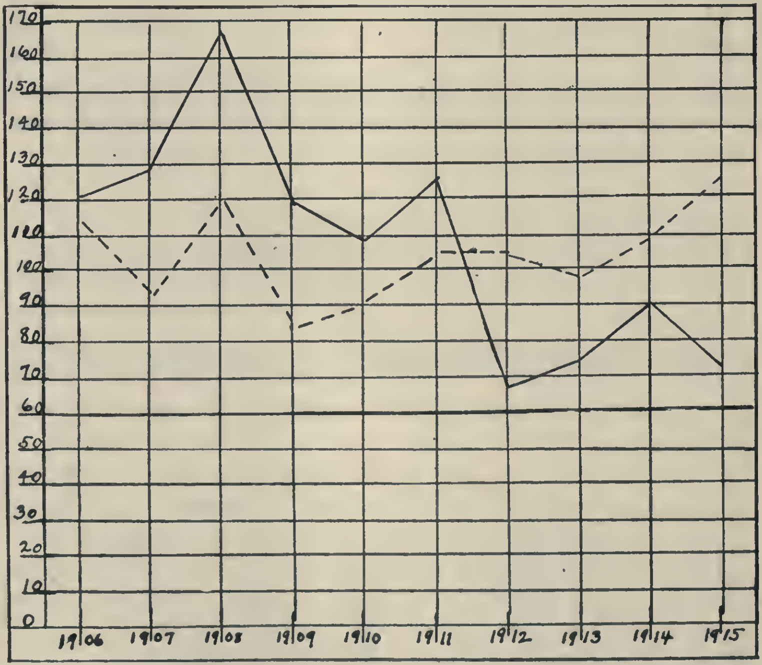
Various explanations have been advanced for the regular periodical recurrence of measles epidemics in the same community. Von Jürgensen doubts that there is such a rhythmic periodic recurrence for any given community and bases his disbelief in such a theory on the fact that he observed no such phenomenon at Tübingen over a long period of years.[7] Crum dismisses the theory of periodicity by the statement that statistical investigations show that when 30 per cent. of a given population have not been exposed to the disease a general epidemic may be expected,[8] but he fails to give the data on which his statement is based, and in view of the difficulties attending the collection of such material on a sufficiently large scale to be of any value, I am at a loss to see how such a theory could ever be proven. Müller advances a similar hypothesis to that of Crum, only he is not so definite in his statements of the number of susceptible persons required to make an epidemic. He says that a measles outbreak in a given community either actually attacks or immunizes the whole susceptible population and that the off years following the epidemic simply represent the time required for a new susceptible generation to come into existence.[9] If this theory were correct, it would seem that in a continuously susceptible population the yearly morbidity from measles would remain practically constant. Although it is obviously impossible to say with

CHART NO. 5



Number of measles cases per 1,000 immigrants arriving at Ellis Island—1900-1914 certainty that the immigrant population passing through Ellis Island is continuously susceptible to measles, it would seem likely that such was the case. They represent large handfuls of children of all ages, picked up more or less at random from widely-separated European communities, and I think we could certainly never find a more continuously susceptible population than that which is thus gathered together on board the steerage ships. Notwithstanding this constancy of the proportion of susceptible persons passing through Ellis Island the annual morbidity from measles has varied from 0.56 to 1.67 per 1,000 immigrants for the last fifteen years. This is shown graphically in Chart No. 5. That this variation is not dependent upon the varying proportion of children among the immigrants will be made apparent by inspection of Chart No. 6. The exact proportion of children to the total number of immigrants is not available before the year 1906, but since that time it can be seen that the proportion

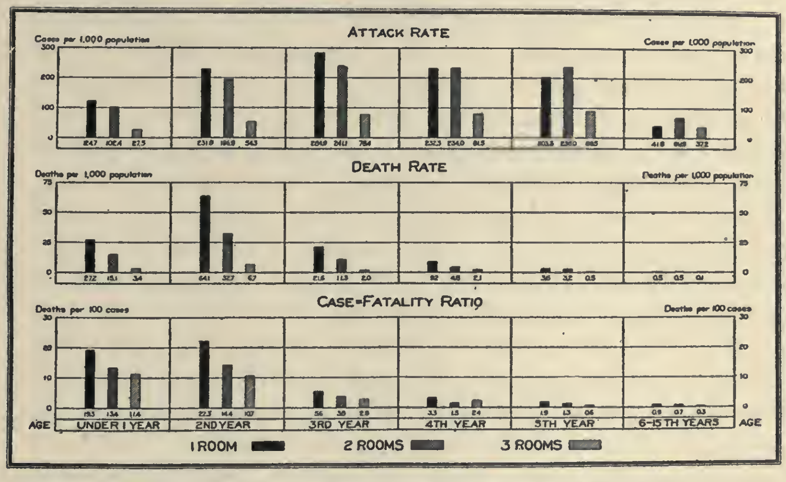
CHART NO. 6



Solid line: Number of measles cases per 100,000 immigrants arriving at Ellis Island—1906-1915

Broken line: Number of persons under fourteen years of age per 1,000 immigrants arriving at Ellis Island—1906-1915

CHART NO. 7



Relation of housing to measles—Glasgow, Scotland, 1908

of children to total number of immigrants has borne an inconstant relation to the yearly variations in measles morbidity. A study of all the available data simply establishes the fact that measles epidemics show a periodicity of recurrence, and that this periodicity seems to vary in different places. In my opinion the underlying reason of this phenomenon has not yet been solved. There is only one factor which appears to bear a causal relation, and even this is incapable of explaining it in its entirety. This factor is *overcrowding*. Williams showed very clearly how this influenced the situation at Ellis Island in the Detention Rooms for Immigrants,[10] and the same problem was worked out by the health authorities in Glasgow, where both the incidence and the fatality of the disease was shown to bear a direct relation to the number of rooms occupied by the family. (Chart No. 7.)[11]

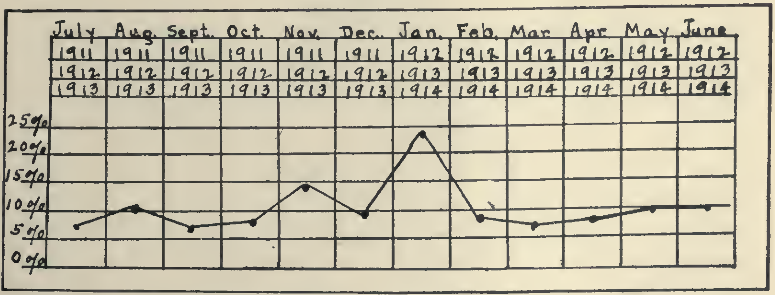
Having thus briefly hinted at some of the unsolved problems which affect the incidence and fatality of different epidemics, it will be pertinent to refer to the three most important complicating conditions which influence the course and termination of the individual case. These conditions are: (1) Suppurative otitis media, (2) bronchopneumonia, and (3) cross infection. The statements which I shall make relative to these conditions are based on personal observation of the patients and an examination of the histories of over 2,000 measles cases in the Contagious

Disease Hospital at Ellis Island. The admissions to this hospital are derived exclusively from arriving immigrants. Consequently the patients are of both sexes and practically all ages, the age and sex distribution being that normally to be expected for the particular disease treated. In the three-year period, from the opening of the hospital June 20, 1911, to July 1, 1914, there were 2,706 admissions, exclusive of contact and accompanying cases. These were made up as follows: German measles, 27; whooping-cough, 31; chicken-pox, 55; epidemic cerebrospinal meningitis, 40; diphtheria, 44; scarlet fever, 318, and measles, 2,191. It thus appears that in point of numbers measles was four times as frequent as all the other contagious diseases of children combined. Largely owing to the fact that so many of our admissions are exposed to more than one contagious disease on board ship and in the transfer barges before arrival, we have a certain percentage of unavoidable cross infection. Thus of the 2,191 measles cases 28, or 1.2 per cent., developed scarlet fever, 36 developed diphtheria, 29 pertussis, 4 chicken-pox, 3 mumps, and 3 German measles. In other words, 4.7 per cent. of the measles cases were complicated by some other contagious disease. This fact added materially to the measles mortality. Of the 2,191 patients admitted with measles, 209 died, making the case mortality 9.5 per cent.; 20 of the 36 cases which contracted diphtheria died, giving a mortality of 66.6 per cent.; 13 of the 28 cases which contracted scarlet fever died, giving a mortality of 46.4 per cent. Cross infections with other diseases showed a much lower fatality than the measles-diphtheria cases or the measles-scarlet cases. Altogether there were 39 deaths among the measles which developed other contagious diseases, making a total case fatality rate among this class of patients of 37.8 per cent.

Among the complications of measles, suppurative otitis media was the most frequent and bronchopneumonia the most fatal. The former occurred in 18 per cent. of the cases. Although a frequent complication and rather difficult to cure, it did not add materially to the fatality rate. Indeed, it seems that the incidence of otitis media does not bear much relation one way or the other to the case fatality in the measles patients which have come under our observation. At the present time, with the lowest measles fatality rate in the history of the hospital (8.75 per cent.) we are having the largest incidence of otitis media (28.75 per cent.). In the 2,191 cases considered, mastoiditis was operated upon twenty-eight times; 25 of these patients recovered. The ones who died developed some other complication apart from the ear or mastoid trouble. It happened that not a single measles death of the whole series could be reasonably attributed directly or indirectly to any ear complication. Except in a very few instances the otitis cases were kept in the hospital until all discharge from the ear had ceased and the recovery of the patient had been in every way effected, consequently it cannot be objected that our patients passed from observation too soon to warrant an opinion as to the gravity of the ear complication.

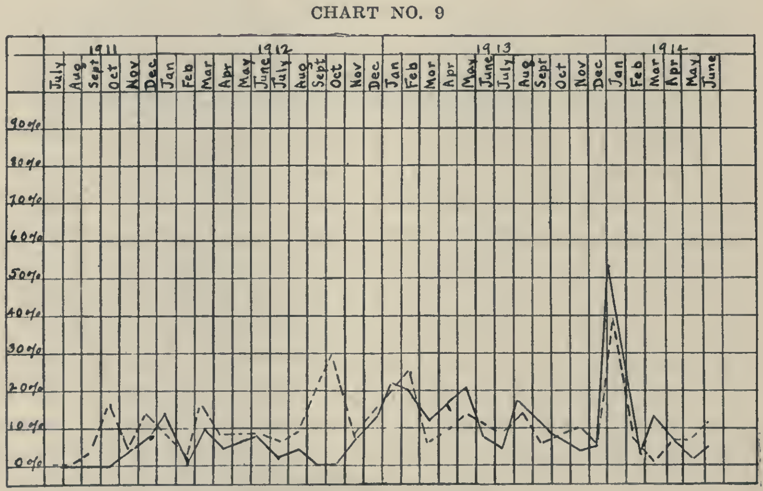
It is commonly stated that the incidence of bronchopneumonia is largely determined by exposure to inclement weather. A study of our cases ought to be particularly valuable to determine the influence of this feature, because, speaking broadly, one might say that the great majority had been exposed to whatever outside weather conditions existed at the time of their admission. A large percentage developed measles on shipboard and were subjected to all kinds of unfavorable weather conditions before admission. Another large percentage developed the diseases in the detention rooms of the Immigrant Station, where there was much variation both of temperature and air movement. Only a very small number can be said to have been free from exposure to the outside weather conditions existing at the time of their admission. Notwithstanding this fact we found that the incidence of bronchopneumonia bore only an indifferent relationship to the cold and disagreeable months of the year. Twice during the months of January there developed a much higher rate of ill-

CHART NO. 8



Percentage of measles cases developing bronchopneumonia according to months in the three-year period July 1, 1911, to July 1, 1914 ness from bronchopneumonia than the average rate for the whole period, and if we group the months together for the whole three-year period we find that November and January are the only ones that show any marked deviation above the normal average of approximately 10 per cent. (Chart No. 8.) However, when we study the incidence of this complication serially month by month throughout the whole three-year period, we find that the monthly variations have been considerable for all seasons of the year. (Note the monthly variations in Chart No. 9.)

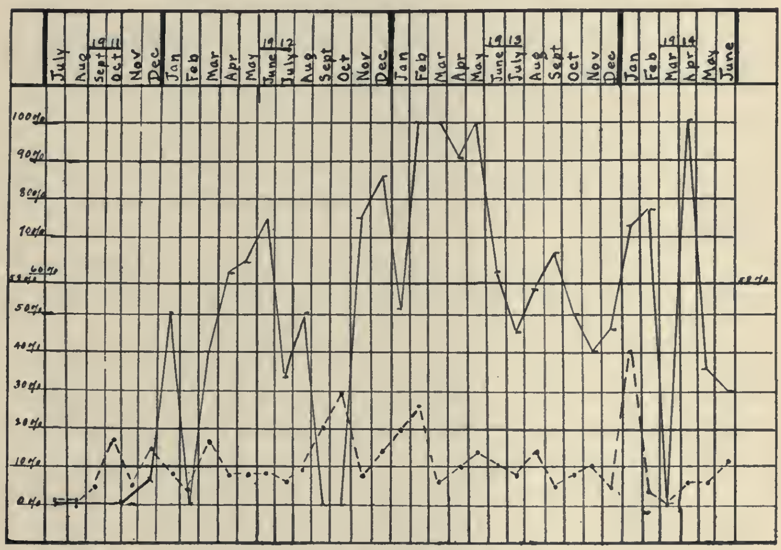
CHART NO. 9



Solid line: The total measles mortality (all cases)
Broken line: Percentage of measles cases that developed bronchopneumonia

Three years is hardly sufficient time from which to draw final conclusions as to the influence of season on the incidence of bronchopneumonia as a complication of measles, but so far as our figures go they seem to indicate that this influence is small. A greater influence would seem to be exerted by some unknown factor which determines the general severity of the epidemic. This is graphically shown in Chart No. 9, where the general relation of *illness* from bronchopneumonia and the total *measles* mortality is an exceedingly close one. The close relationship of these two curves is apparently entirely independent from the curve which shows the *case mortality* of bronchopneumonia. Chart No. 10 shows this lack of relationship between *deaths* from bronchopneumonia complicating measles and the *deaths from measles due to all causes.* (Chart No. 10.) When we compare Charts 9 and 10 we see that in our series of cases the fatality from bronchopneumonia was not nearly so constant as the incidence of the complication itself. Roughly speaking, 58 per cent. of the bronchopneumonia cases died, but note the many and wide fluctuations from the average. Also in general terms 10 per cent. of the measles cases died, but here the deviations are not so great, and they follow the deviations in the *incidence* curve of bronchopneumonia almost exactly. The obvious inference from these figures is that in a given series of cases the *prevalence* of bronchopneumonia rather than the *deaths* from bronchopneumonia will indicate the *total* measles fatality. In other words, the prevalence of bronchopneumonia is an index of the severity of an epidemic, and the conditions which make good soil for bronchopneumonia also predispose to an unusual number of cross infections and fatal complications of measles other than bronchopneumonia. Our experience would lead us to believe that, generally speaking, every recovery from measles and

CHART NO. 10



Solid line: Mortality from measles complicated with bronchopneumonia (average 58%)

Broken line: Percentage of measles cases developing bronchopneumonia (average 10%)

bronchopneumonia is balanced by a death from measles with some other complication. Consequently the problem in the treatment of measles is not so much the treatment of bronchopneumonia as it is the determination of the reasons why different epidemics vary in virulence.

SUMMARY

From a study of our own cases and a survey of the literature, it would seem that both the incidence and the case mortality rate of measles are subject to extreme variations and that the cause of these variations is not understood.

From a study of our own cases alone the following conclusions are drawn:

(1) Cross infection, especially that of diphtheria, is the most serious event that can occur in the course of measles.

(2) Suppurative otitis media, although the most frequent complication of measles is not of grave prognostic import when properly treated.

(3) Bronchopneumonia complicates about 10 per cent. of all measles cases, being but little influenced by weather conditions in the frequency of its occurrence or its fatality.

(4) The fatality of measles complicated by bronchopneumonia is 58 per cent., but this fatality varies in an exceedingly erratic manner and without marked relation to the total case fatality of measles.

(5) The incidence rate of bronchopneumonia as a complication rather than its case mortality appears to be an index to the severity of any particular outbreak of measles.

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THE VALUE OF THE WASSERMANN REACTION IN MENTAL DEFICIENCY IN CHILDREN. STUDY OF SEVENTY-EIGHT CASES

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Before the advent of the blood and spinal fluid tests for syphilis, the problem of mental deficiency from an etiologic standpoint could be solved only from data concerning the parents. In a large number of cases the data could not be collected, or, if some information was obtained, it was found frequently to be inaccurate. Tuberculosis, alcoholism and syphilis were frequently denied by relatives or parents. Unless the clinical evidences are conspicuously present in the parents, such as secondary or tertiary syphilitic lesions of a gross nature, or organic diseases of the nervous system, such as tabes and paresis, the occurrence of mental deficiency in the offspring could not always be determined etiologically. Children without gross morphologic changes incidental to hereditary or congenital syphilis, such as the saddle-shaped nose, Hutchinson's teeth, etc., formerly could not be suspected of having a syphilitic potentiality, even if their parents had suffered from an early specific infection. Formerly, with the old methods of treatment rigorously carried out for a sufficiently long period of time, not infrequently individuals remained free from tertiary symptoms or from involvement of the central nervous system. As the infection in such cases was not revealed, and the offspring presented mental anomalies, we were at sea to explain these occurrences pathogenetically.

Parental alcoholism and tuberculosis, if we follow the Mendelian laws of heredity, are bound to produce mental abnormalities in some of the offspring. In such cases, the damage once done, all we can do is to direct our efforts in the domain of educational training. But in cases of parental syphilis we are in possession of powerful remedial agents which are apt to at least improve the hereditary tendency if properly applied. But this can be done only if we possess means of detecting and tracing the syphilitic make-up in children. Fortunately we do possess such means. I have reference to the Wassermann and other tests of blood and spinal fluid. Even in the absence of all external evidences in child and parents every case of mental abnormality in children should be investigated from the standpoint of hereditary syphilis. Not infrequently, as we will see later, the most unexpected therapeutic results have been obtained when the blood serum and spinal fluid were found to be syphilitic. When we compare our efforts in behalf of mental defectives before the Wassermann era with those of present days, we find that a substantial progress has been accomplished. Although the modern method of treatment can be applied to but a limited number of cases, nevertheless the few children benefited by it are a sufficiently conspicuous illustration of the importance of the newer serologic investigations. This limitation of the therapeutic field requires some elaboration.

When syphilis is transmitted to the offspring it may result in arrest of development of such intensity that extensive deformities or actual malformations of the central nervous system and other organs will follow. In such cases therapeutic endeavors are baseless and in vain. The same consideration is applicable largely to idiocy and low grade imbecility. On the other hand, we encounter children with hereditary syphilis in whom there is only feeble-mindedness of various degrees. We also meet with children in whom to the intellectual inaptitude are superadded various nervous phenomena of a more or less serious nature, such as epilepsy, tremors, choreiform movements. In another group of cases there may be a mild degree of mental deficiency and frequent attacks of headache of a more or less severe and persistent character. In the same category of cases one may observe various neurotic phenomena, such as restlessness, outbreaks of anger, of violence, also a tendency to vicious habits. Enuresis is not a rare phenomenon in such instances. Finally, we meet with cases of abnormal mental development associated with gross morphologic changes in the central nervous system, so that the child is mentally defective and at the same time hemiplegic, monoplegic or paraplegic.

Turning our attention again to therapeutic considerations, we find that with the exception of the first group of cases, viz., those with gross malformations, in all others encouraging results have been obtained from the methods based upon the newer serologic investigations. The 75 children whom I have studied, especially from the standpoint of hereditary syphilis, presented mental defects of various degrees. There were 12 imbeciles of middle grade, 4 idiots, 10 imbeciles with gross organic changes (7 hemiplegics and 5 monoplegics), 7 feeble-minded with functional nervous disorders, such as tremor, restlessness, insomnia, enuresis, choreiform movements, 16 feeble-minded with major attacks of epilepsy, 12 feeble-minded with attacks of petit mal, 3 feeble-minded suffering from continuous headache, 3 feeble-minded with colobomata in the eyes, 11 feeble-minded children without any functional or organic nervous disorder. The ages of the entire series ranged between five and sixteen. All these cases, without a single exception, were submitted to a Wassermann test on the serum and only 17 children were examined on both serum and spinal fluid. The results proved to be interesting and instructive. The following table presents the results:

WASSERMANN TEST

Number	Character of the Condition	Serum	Spinal Fluid
2	idiots	+	+
2	idiots	—	+
3	imbeciles	+	
9	imbeciles	—	+
6	imbeciles with organic changes	+	
4	imbeciles with organic changes	—	
7	feeble-minded with functional nervous disorders (tremors, chorea)	+	—(3 cases)
5	feeble-minded with epilepsy (*major*)	+	
11	feeble-minded with epilepsy	—	
5	feeble-minded with petit mal	+	
7	with petit mal	—	
3	feeble-minded with persistent headache	+	
3	feeble-minded with colobomata	+	
5	feeble-minded without functional or organic nervous disorders	+	+(4 cases)
6	organic nervous disorders	—	

We therefore observe that 50 per cent. of these subjects present a positive serum reaction and that in the 17 cases in which I succeeded in obtaining the spinal fluid also, the Wassermann tests ran parallel in both, except in 3 cases of the feeble-minded with functional nervous disorders. The significance of such findings is of interest not only from the point of view of inheritance, but also from a therapeutic standpoint. Nonne, in his book on "Syphilis and the Nervous System," speaks of various organic and functional nervous disorders in children with inherited syphilis, who improved and some recovered when put on antispecific treatment. He cites Ziehen, who treated a feeble-minded girl thirteen years old with loss of knee-jerks, who, being treated energetically, recovered her reflexes as well as the intelligence. It may appear at first glance somewhat paradoxical to expect a normal development of mental functions in an individual who for years presented a deficient intelligence. Nevertheless, careful observation and strict analysis of the cases of congenital or inherited syphilis demonstrates this fact that paternal syphilis may produce an impaired germplasm, hence permanently defective offspring, or else the mental deficiency may be more or less pronounced and still amenable to improvement. In the latter case it may be admitted that the child was born with a chronic meningoencephalitis distinctly syphilitic in nature or else it inherited the spirochetæ. In both cases mental deficiency will be observed, but the underlying pathologic condition will be most favorably and most promptly influenced by antisyphilitic remedies. The latter observation is of practical and social importance. It is therefore evident that detection of such recoverable cases or cases which are at least apt to improve is of paramount value. If there is a certain percentage of cases that is permanently damaged by congenital or hereditary syphilis, there is, on the other hand, a sufficiently large number of cases whose mental deficiency has for a basis a syphilitic inheritance, but which may be greatly benefited by the early discovery of this hereditary feature. Fournier, the Nestor of syphilology, in his numerous works on the relation of syphilis to the nervous system, cites many instances of children who, suffering from various vague nervous and psychic disorders, remained unaffected when treated with remedies not syphilitic, but who rapidly improved and eventually recovered as soon as antisyphilitic treatment was instituted. Formerly the relation of syphilis to the mental status of the affected child was recognized when it was actually in evidence, or it was surmised in the absence of clinical manifestations. It stands to reason that in a number of instances this question was overlooked and many a child was condemned to continue its pathologic existence. Our position at present is totally different from that of our elders. We are in possession of a powerful method of detecting a syphilitic or a monosyphilitic basis for morbid phenomena referable to the central nervous system and to neglect this method of investigation means to condemn to inevitable disaster many a child who otherwise could be spared and permitted to reach a useful adult life. It appears, therefore, urgent in every case of involvement of the central nervous system in childhood to submit the child to a Wassermann test of the blood and, if possible, also of the spinal fluid. In case of a single negative result the test should be repeated at various intervals. Should the latter prove to be positive, vigorous and prolonged treatment with antisyphilitic remedies is to be instituted. Among the latter, salvarsan or neosalvarsan is to be commenced with. In older children the intraspinal method of autosalvarsanized serum is to be preferred to the intravenous method. Several injections can be made at different intervals. Mercury and iodids are to be given between individual injections.

Every one of the cases described in the above table was submitted to a Wassermann test by the author. The cases that are marked negative Wassermann had several examinations made. Every one of the positive cases was treated with antisyphilitic remedies. The very young children, up to the age of five, were given mercurials and iodids. From that age on the treatment commenced with neosalvarsan, then continued with mercury and iodids. The intraspinal method of salvarsanized serum was used exclusively on children of fifteen and sixteen years of age and was supplemented by mercury and iodids. Mercury was given exclusively in the form of inunctions and continued until the point of intolerance. Iodids were given at first in very small doses and gradually increased to very large doses. One child of twelve was able to take 100 drops of a saturated solution of sodium iodid three times a day and one of fifteen years of age took 210 drops three times a day. The result of this treatment can be summarized as follows: Improvement in general health was observed in every one of the cases with a positive Wassermann reaction. As to the defective mentality, the idiots and genuine imbeciles remained unresponsive to the treatment. The imbeciles with organic changes in the central nervous system, the hemiplegics and monoplegics were not influenced by the treatment. The feeble-minded with epilepsy, on the contrary, showed decided improvement. It must be borne in mind, however, that epilepsy is not infrequently associated with mental deficiency and that the mentality in such children may remain undeveloped or be arrested in development because of the frequent cortical irritation causing the epileptic attacks. It is a common observation that when the convulsive seizures in such cases are removed, or even rendered less frequent and less intense, a decided improvement in the child's mentality takes place. In the cases of my series the improvement from salvarsan ran parallel in the mental condition and in the epileptic seizures. Two of these patients have shown such a remarkable progress that a successful attempt was made in giving them instruction in languages and arithmetic. According to the parents a notable improvement was observed in their retentive faculty and the 5 feeble-minded children with petit mal attacks showed unusual improvement. In 3 of them the attacks disappeared totally, and 1 of them commenced to learn bookkeeping. The improvement in attention and memory was striking. The two other children of this group were sent to school, where the teacher reported continuous progress. The 3 children with persistent headache showed rapid improvement. The pain in the head disappeared completely and the patients' mentality steadily got better. The same degree of improvement in the intellect was noticed in the seven patients with tremors and choreiform movements. The most striking degree of improvement was obtained in the feeble-minded children without functional nervous disturbances. One of them was a boy of eight, who never showed any aptitude for acquiring knowledge, whose memory was very deficient and who exhibited frequently anger with desire to attack. The improvement was so conspicuous after the antispecific treatment was instituted that in six months he was sent to school and his progress was uninterrupted. His behavior changed totally, the outbursts of anger disappeared completely, his retentive faculty became decidedly better. The remaining children of the same group were improved to a greater or lesser extent. It is to be noted that I spoke of improvement, but not of recovery. Indeed, it is impossible to speak of recovery when the problem consists of removing a chronic diffuse cerebral condition of syphilitic nature dating from infancy. It was interesting to me to observe that the younger the child and the more prolonged the treatment the more rapid and the better results followed. Unfortunately, the children that came under my observation had no treatment at all for several years. The youngest subject was five years old. Some of the children reached me at the age of ten, fourteen and even sixteen. Moreover, some of the parents objected for months to a Wassermann test and thus considerable time was lost. Making an allowance for all these difficulties, it was highly instructive for me to learn that a considerable amount of good can be accomplished by instituting the proper management at the earliest possible period of life in cases of mentally defective children. The other conclusion which forces itself is the urgent necessity to perform a test for specificity on blood serum and the cerebrospinal fluid in every case where mental deficiency is present. I have omitted many details with regard to the variations in the treatment in each individual case. The therapeutic management, with regard to the doses and their increase or decrease in each individual case, is too well known to dwell upon. The object of this contribution was to call special attention first to the occurrence of a large percentage of positive blood tests in mentally defective children, and, secondly, to the enormous practical value of such a test for therapeutic purposes.

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ACIDOSIS IN CHILDREN—A. A. Howard (Boston Medical and Surgical Journal, 1915, Vol. CLXXII., p. 747) says that acidosis in children is of frequent occurrence. Recurrent or cyclic vomiting, as distinguished by absence of predisposing factors, is extremely rare. Cases apparently of this type should be subjected to careful study for possible concealed pathologic conditions. The common clinical type of acidosis is what might be termed a complicating acidosis with predisposing factors. Clinically there are numerous conditions which seem capable of acting as predisposing etiologic factors in the production of an acidosis. Acidosis should be considered a serious condition. Its early recognition and treatment is of practical clinical importance. Prophylactic measures are indicated and practical. Good results are secured by having the mothers start acidosis treatment, including cathartic, soda bicarbonate and light carbohydrate diet at the first indication of any illness.—*American Journal of Obstetrics.*

RECOVERY OF THE COLON BACILLUS FROM THE SPINAL FLUID OF A FIVE MONTHS' OLD INFANT

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In September, 1915, the author was asked to perform a lumbar puncture on an infant who showed meningeal symptoms. It had been attempted three times and each time blood only was obtained. The needle was inserted between the second and third lumbar vertebræ, and 6 cm. of a thick brownish, purulent fluid was withdrawn. A smear was made immediately and the microscopic field was found packed with polymorphonuclear leukocytes and intra- and extra-cellular bacilli. A study of this bacillus proved it morphologically to be a short, motile, Gram-negative bacillus. In stab and surface colonies on gelatin it did not cause liquefaction. It acidified and coagulated milk in twenty-four hours. It gave a yellowish growth on potato, and a green growth on neutral-red media. It fermented all the sugars, dextrose, levulose, lactose, saccharose, maltose, galactose, mannite and dextrin. In the fermentation of dextrose the proportion of hydrogen to carbon dioxide was 2:1. These tests characterized the organism as the colon bacillus, and differentiated it from organisms of the typhoid group, the cholera group, the bacillus icteroides, the bacillus acidi lactis, bacillus pyocyaneus, and the bacillus mucos capsulatus.

The History of the Case—The patient, a five months' old infant, was brought to Cook County Hospital, September 9, 1915. The child had been ill a week with vomiting and diarrhea.

Examination showed an acutely ill, poorly nourished infant, weighing 9 pounds and 1 ounce. The ears and throat were negative. The eyes were sunken, the pupils contracted and reacted sluggishly to light. The neck was rigid, as were also all the extremities. The reflexes were exaggerated. There was a double Kernig's sign and a Brudzinski contralateral sign, as well as a double Babinski and a tâche cerebrale.

From the time of the child's entrance until its death, September 25th, there was little change in the physical findings. The temperature was remittent in type, 100°F. in the morning and 104°F. in the afternoon. The stools, usually two a day, were brown and contained mucus. A purulent conjunctivitis developed on the third day, but smears from the pus showed only a small, Gram-positive diplococcus. On the tenth day a note was made on the history sheet that the general condition was worse; rigidity more marked.

Lumbar puncture was said to have been performed on the tenth and again on the eleventh and fifteenth day, but each time there were obtained only a few centimeters of a blood-stained fluid, which on microscopic examination showed chiefly red blood corpuscles. It is probable that at these times the needle never entered the spinal canal, but rather pierced a vein, and that the fluid withdrawn was purely blood. The author's puncture was made eight days later, with the findings described above. There is no doubt that at this time the child was suffering from a colon bacillus infection of the meninges. There is a possibility that the infection took place when attempts at puncture were made. Against such a possibility are the facts that the child had definite meningeal symptoms on entrance to the hospital, and that the meninges are difficult to infect by a lumbar puncture. A careful perusal of the literature, including Allard's exhaustive review in the Ergebnisse für innere Medizin u. Kinderheilkunde (1909), failed to disclose a single report of such an accident. On the other hand, it did disclose reports of several cases of colon bacillus meningitis of hematogenous origin. Holt (1911) reports 2 cases, both in babies four weeks old; Hinsdale (1899), 1 case; Goldreich (1902), 1 case; Sherer (1894), 3 cases; v. Reuss (1914), 1 case—all in newborn infants. Nobicort and Pasquier (1902) report a case in a seven months' old infant, suffering from gastroenteritis. In all these cases the fluid obtained by lumbar puncture was described as a thick, yellowish or brownish pus.

From the study of this case, the author feels she can add another case to the few instances reported of colon bacillus meningitis of hematogenous origin.

A SHORT HISTORY OF INFANT FEEDING

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Infant feeding nowadays has such a widespread interest that it is surprising that our ancestors should have left so few records on this subject. It was not their custom to concede much importance to childhood and infancy, and they rarely even in their letters preserved for us any detail of infant life. Previous to the fifteenth century we find nothing in the literature pertaining to the feeding of infants. The three early fifteenth century books, "The Book of Nurture," "The Babees Book," and "The Book of Curtasye," which recount even the most intimate particulars of adult life of the period, contain no word on the subject. Indeed, it is not until the sixteenth century that we derive any knowledge from medical writers. The first of these issued in 1487 by Paulus Bagellardus was entitled "De Aegritudinibus Infantum." The earliest English book appeared in 1567, when Thomas Faier published "The Regiment of Life," the first section of which is styled "The Book of Children." Under the Stuarts only two or three authors continued in his footsteps. In the Georgian period, however, medical interest in the subject began to awaken, and during the eighteenth century a dozen or more books appeared. The output doubled in the first half of the nineteenth century, until now, at the present day, every branch of pediatrics is covered by a library of its own.

Even the earliest of these books contains some accounts of the contemporary methods of infant feeding. The authors, however, naturally did not explain the factors that were helping or retarding the evolution of their practice. The medical writers are, of course, silent if we ask why other and obviously better methods were not employed. Artificial feeding, for example, as a substitute for the breast, is not even mentioned until the eighteenth century, and has filled its place only within the past fifty years. As to the cause of this state of affairs, we must turn to another source of information—to the social and economic records of the common people.

Clean food is an essential item in healthy infancy, and contamination comes from bad social and domestic surroundings; therefore, by studying the social conditions in each century we are likely to find an explanation, not only of the changing conditions and customs of successive periods, but of the practical difficulties that for so long held back any improved methods. Meager sources of information open to us are collections of family letters that have survived to the present day. However, only momentary light is thrown into the old-time nursery, as fathers, and even mothers, when corresponding with each other, seldom mentioned their children except in formal terms. Perhaps this was because children were so common and large families the rule. Beyond exacting from them implicit obedience, they allowed themselves to show no great interest in the little incidents of their children's daily lives.

We are probably safe in assuming that the lines on which infants were reared had altered little, if at all, during the three or four centuries before Elizabeth. Each generation accepted the tradition handed down by the one preceding. Breast-feeding was practically the only means of nourishing a young child. Feeding bottles had not been invented, and the artificial foods were limited to bread and pulse (a porridge of beans, peas or lentils). Cow's milk was not even mentioned in this connection. The infant was given no choice but the breast, either of its mother or of a wet-nurse. Paulus Bagellardus tells us that the mother (or wet-nurse) customarily suckled her child for two or three years. This practice has been continued up to the present only by the ignorant and the less highly civilized peoples, notably the Negroes, and the Esquimaux. Among civilized peoples the period of suckling has been growing shorter steadily, until now six to eight months is the average time of nursing. Even in those days mothers, like many modern mothers, found that nursing interfered with their social duties, and those who could afford them were glad to shift their maternal duties to hired wet-nurses or foster mothers. It is hard to realize, in this day when wet-nurses are rare and far between, how widely they were in demand in previous generations.

The foster mother, of course, dates back beyond the records of history and continued until the nineteenth century sucking bottle was her undoing. When wet-nursing first became the fashion, it was opposed on much the same grounds as bottle-feeding was a few years ago. The degeneracy of the race was prophesied. However, like all conveniences, it continued to flourish. Around the foster mother clustered many odd beliefs and superstitions. Thomas Faier (1567), a contemporary, said of them: "I intend to write somewhat of ye nourse and of ye milke with ye qualities and complexions of the same. Phavorinus (an early Roman writer) affirmeth yt if the lambes be nourished with the milke of goates, they shall have course wölle lyke the heare of goates; and if kiddes in lyke maër suck upso shepe ye heare of them shall be soft lyke wolle." Taking this centuries-old statement as a dreadful example, they believed that various characteristics could be transmitted. For instance, that an ill-tempered woman would transmit her vice with her milk; if she were red-headed, a treacherous mind would be transmitted; and many other strange beliefs, some of which have even persisted up to the present day.

In conjunction with the foster mothers were the baby farmers, who flourished chiefly during the reign of Elizabeth. The mothers, and there were many of them, unwilling to tend their children, would send them to nurses in the country and there farm them out. For generations these notorious baby farmers plied their trade and the parish records of England show many instances of infant deaths reported by them. We can only speculate as to the cause of these deaths, but can be morally sure that they were not natural ones. Dickens, in "Nicholas Nickleby" (Dotheboys Hall and the infamous Squeers), draws a picture of one of these farms (early nineteenth century) with a great deal of fidelity. During previous generations we can imagine how much worse conditions must have been.

Apart from any question of baby-farming, infant deaths were common enough from natural causes. A civilization which recognized practically none of the tenets of sanitation was bound to suffer a heavy wastage of infants. Yet, artificial feeding, which is one of the most prolific causes of disease and death, was not practiced. No doubt the "goate and shepe story" frightened many. If a lamb grew a beard from suckling a goat, what would befall a child if fed on cow's milk? This, we may be sure, was duly debated, and the claims of cow's milk were not even considered. Even graver objections to the use of milk were the frightful conditions existing in the large cities, notably London, and this was no exception, the continental cities being equally filthy. As one reads the description of that city one comes to the conclusion that it was one vast cess-pool, with latrines, rotting refuse and no drains. Within doors conditions were no better. Erasmus describes the filthy state of the dwelling houses. The floors, he says, were commonly of clay and were strewn with rushes, beneath which lay, unmolested for years, an old collection of spittle, beer, decayed fish and other excreta even more disgusting. All these conditions made artificial feeding impossible. Country conditions were the same. One wonders why they didn't boil the milk, but here again the boiling of milk was regarded by the doctors, for some unknown reason, as injurious, and thus this means of sanitation was eliminated. Besides all these facts, bodily cleanliness was the lot of few babies. Even the highest in the land were bathed but seldom, and the body excrements were made more bearable by the use of unguents and strong perfumes. The belief that the eczema "which comes behind unwashed ears" was a natural attribute of the young died hard. As late as 1783 (Underwood) we are told that "in most infants, sooner or later there is a discharge from behind the ears, which at first oozes out in the form of a sweat." Thus we see the manifold disadvantages that the baby had to struggle against.

The Stuarts, in the seventeenth century, introduced many comforts and improvements in their domestic life, but showed little or no originality in dealing with their children. Old traditions prevailed. In matters of feeding the mother and the wet-nurse remained the only alternatives. With unclean houses and unsanitary towns hand-feeding was still a deadly undertaking. Infant mortality had become terrible, two-fifths of the total deaths being children under two years of age. In some years more than half the births were wiped out by infantile disease. We read that in each of the hot summers of 1667-1671 diarrhea alone added 2,000 to the mortality in eight weeks. No mention is made of artificial feeding, so *it* can't be blamed. John Peachey, in his "General Treatise of the Diseases of Infants and Children," 1697, has nothing to say on the subject. However, on the subject of weaning he is the first author to give prominence to this topic. He states that a vigorous child is able to leave the breast earlier than a weak one, and therefore there is no fixed time for weaning. On an average, however, a child should "suck a year and a half to two years." His golden rule was, "The child must not be weaned until it has all its teeth," a doctrine to which there would nowadays be no subscribers. In weaning a child according to Peachey there were other factors to be taken into consideration; for instance, there were astrologic influences to be consulted. It was decided that a child must never be weaned when the moon is on the wane. Another factor in weaning was the child's dislike to strange foods. To overcome this and to make the infant reject the breast the mother's nipples were smeared with either wormwood or aloes. Pap and chicken broth were the earliest additions, and then bread, milk and boiled potatoes were added. Meat when given was first chewed by the nurse—a pleasant thought. Peachey's methods of weaning after two years (or when all the teeth were in) persisted for the following 250 years, the period of breast-feeding being gradually decreased, until to-day popular custom places it at six to eight months, or when the first tooth in each jaw has been cut.

Early in the eighteenth century changes were in progress. If the mother could be supplanted, why not the wet-nurse? Why not employ some other food than human milk? It was finally considered safe, about the middle of the century, to give water-pap as soon as the first tooth had appeared. Cow's milk was still objected to. The breast was not withdrawn altogether until the child was two years old, and for the first time in history mixed feeding was employed. Water-pap, made of bread and baked flour, proved so successful that others were pressed into use. Weak broth was given with the first tooth, with the second the minced wing of a chicken. For the first time sugar was added, being given with bread boiled in water. Other foods recommended were French bread, hashed meats, and, last but not least, small beer with egg yolks beaten in!!!

Michael Underwood, in his admirable (for the period) "Treatise on the Diseases of Children," which ran into ten editions, the last in 1847, although influenced by hoary traditions, still endeavors to free himself from the prejudices of the age. He is the first who seriously attempted to find some substitute for breast-feeding. In spite of his evident sincerity of purpose he criticizes Dr. Armstrong, a contemporary, for advocating the use of the pap-boat and spoon in too many instances. He approves of the argument advanced by Mr. Moss, who observes that the gastric juices of every individual animal may be supposed to be the best suited to act upon its respective milk.

"Reason, instinct and experience," says Dr. Underwood, "all conspire to support this opinion, and the duty of suckling has the sanction of the most ancient writers, being distinctly noted by Pliny. Van Swieten remarks that one of the Queens of France suckled her own son, and continued it even during a fever. One of her Court ladies, having on some occasion, given the youthful prince her breast, the Queen was so disgusted at it that she forced her finger into her son's mouth to excite vomiting, unwilling that it should receive nourishment from anyone but herself." A bit of unconscious humor taken bodily from Underwood follows: "In some very northern parts of the world, as those of Greenland and the neighboring country of the Esquimaux, the breast appears to be, in the strictest propriety of speech, the only food that nature has provided for infants; insomuch that whenever a suckling mother happens to die her infant is buried with her. Experience (one would hope) having demonstrated the inefficiency of the hard and coarse diet which nature has there so sparingly dealt out, it is esteemed an act of compassion to put an end to the infant's sufferings *by plunging it into the sea.*" However, where the breast is not available Underwood considers milk the most proper food and wonders at the *weird* mixtures given in the past. To quote again: "It has indeed been a wonder to me how the custom of stuffing newborn babies with bread and such like could become so universal, or the idea first enter the mind of a parent that such heavy food could be fit for the babies' nourishment at the age of six or seven months. This food may be justly considered a poison, which, if not puked up, or very soon voided by stool, may occasion sickness, gripes (inward fits), and all the train of bowel complaints, which may terminate in Worms, Convulsions, Rickets, Scrofula, Slow Fevers, Purging and a fatal Marasmus." Recognizing the importance of choosing a milk as near as possible to mother's milk, he includes in his treatise two comparative analyses of the milk of women, cows, goats, asses, sheep and mares. The conclusions that he draws are that cow's milk is best suited for the ordinary case, but for the very young or in bad cases of diarrhea asses' milk is to be used, as it is thinner and has far less curds than other milks. To this milk a diluent of barley water is suggested as an addition. This is the beginning of milk dilution and marks a decided step in advance. Some years later than this other diluents besides barley were mentioned, the most advocated one being a small quantity of light jelly made from hartshorn shavings, boiled in water to the consistence that veal broth acquires when cold. To this was added a little Lisbon sugar, or loaf sugar. Here, too, in Underwood is first mentioned the importance of the after care of the milk receptacle, a "new" pot invented by Dr. Smith. This pot should be carefully cleansed and scalded, he advises, at least once a day, and the spout thoroughly rinsed, lest any sour curds should stick about it. In regard to the milk itself, he urges that it should first be boiled "to render it less opening," but when the child is several months old, or may chance to be costive, it need only be warmed. If it be fresh from the cow and very rich, a portion of the diluent should be added while the infant is very young. "Indeed, the milk should be as new as possible, since milk, as an animal juice, *probably contains some fine subtle particles,* which evaporate on its being long out of the body. In regard to the method of feeding the milk, Underwood advocates his friend Dr. Smith's special pot. He states that the boat, the spoon, and the horn require no exertion on the part of the infant and therefore it is tempted to take too much at a time. To quote: "The nurse often gives two or three boatfuls of milk at a time to put a stop to the infant's cries, which indigestion from the former may have caused." The Smith pot obviates all these disadvantages, according to the author.

This pot was shaped like a gravy-pot, with a long spout rising from the bottom, and pierced only with a few small holes at the end, which was covered with a piece of vellum, washing leather or parchment. This the inventor claimed was "soft and pleasant in the infant's mouth, and nearly as acceptable to many children as the breast."

For the diet of older children he gives broth, beef-tea, puddings made of bread, semolina, tapioca (new at the time), or rice, and salep boiled in milk. Later he gives light meats, vegetables and "red wine" to counteract the tendency to rickets. All these during the first year in many cases. The weaning period was held to be about twelve months, or when the child had cut at least four teeth.

It is very evident, then, that feeding in general was proceeding very slowly and that the medical profession were still much in favor of the breast and nothing else. William Buchan (1804), in his "Advice to Mothers," devotes pages to the advocacy of breast-feeding. He states: "The happy consequences of universal breast-feeding would be no less striking in a medical than in a moral point of view. A stop would be put to the cruel ravages of death in early life. The long catalogue of infantile afflictions would become a blank, or contain nothing to excite alarm. Every child invigorated by its mother's milk would, like the young Hercules, have force sufficient to strangle in his cradle any serpents that might assail him. In short, health, strength and beauty would take the place of puniness, deformity and disease; society would be renovated, and man would soon rise to the full perfection of his nature."

Three notable developments occurred during the nineteenth century: (1) Artificial feeding, (2) proprietary foods, and (3) the invention of the sucking bottle.

In the opening years of the century mixed feeding was in general use. A variety of concoctions was recommended for breast-fed infants a few weeks old. Water-pap still figured prominently, while oatmeal, rice, or barley boiled in cow's milk was given at the end of the first month. Herb tea and beer soup were approved of. We feel no surprise at the contemporary mention of a three months' "belly ache" that was prevalent among children of that age, or of the "weaning sickness" that lay in wait for the breast-fed infants. At six months puddings (bread) were frequently given, and at eight months meat. By 1825, however, it became recognized that for the first five or six months, at any rate, mixed feeding should be avoided and the breast alone given. In spite of this conclusion, artificial feeding continued to develop, though the obstacles in its way were for a long time serious.

As infant feeding and infant mortality are so closely bound up with each other, the records of infant deaths should throw some light on the subject. From 1780 to 1816 (Forsythe), in London, there were 56,000 births and 19,000 deaths under two years of age, or approximately 34 per cent. Of these, the mortality was 80 per cent. hand-fed, or 7 out of 8. The Paris Foundling Hospital had a mortality of 85 per cent. of 32,000 infants, while in Dublin, of 10,000 children admitted to the hospitals during the years 1775 to 1796, only 45 survived—in other words, 99.6 per cent. died—a simply frightful mortality. It is therefore plain why artificial feeding was regarded with such suspicion and why it made such little headway.

No small share of this failure in artificial feeding must be laid on the want of suitable feeding materials. Ordinary household cups and spoons were ill adapted for this special purpose. A vessel was needed from which a child could take its food by the natural act of sucking. A cow horn naturally suggested itself, the original sucking apparatus evolving in 1783. It was taken from a calf or a small cow, was scraped and polished and its tip perforated. To a notch cut around the smaller end were tied two small pieces of parchment or leather sewed in such a manner that the food could be sucked through between the stitches. What accumulations of soured and decomposing milk and saliva would collect in the horn and between the stitches we can but guess, and we read without surprise that any child brought up on it "is in danger of falling into the watery gripes." Before long a glass bottle was introduced, the modern bottle owing its form to the original cow's horn.

For children, who for some reason or other had no horn, there were the "pap-boat," the "pap-spoon," and the "infant feeding pot," all shaped somewhat like the modern sauce-boat, but with smaller nozzles. These were made of pewter or of silver. To these was soon added a teat made of parchment or of leather. To prevent this from collapsing, when the child began to suck, a piece of sponge was inserted, thus adding yet another breeding place for germs. In 1826, the results being far from ideal, a *heifer's teat* was pressed into service. When not used, it was kept in alcohol, and by this means its life was prolonged until it finally putrefied *and the child was no longer willing to accept it!* These unsatisfactory nipples were retained until the middle of the century, although others were tried—decalcified bone, wood, metal, and rubber, but all were discarded for their predecessors. In 1860 a new style of feeding bottle, called "Biberons" (made in France), was introduced. This was made of glass with cork nipples. Air was admitted by delicate spiral tubes, and the flow was regulated by ivory pins fitting into the openings at the opposite end. This Gallic contrivance was exceedingly complicated and fragile, so in 1869 a pear-shaped bottle was devised, the broader end being fitted to receive a large round rubber cap, elevated at its center as a teat. This, owing to its presumable resemblance to the mother's breast, was called "Mamma." The next step in the bottle's evolution was the Alexandra, which prolonged the nipple as a flexible tube. When the necessity for cleanliness was understood these tubes were thrown away, a small hollow elastic teat was employed, and the bottle itself evolved to its present shape, similar to the old cow horn. This has continued in use up to the present in spite of various so-called improvements which are put on the market from time to time.

With these feeding bottles thus perfected it was natural that cow's milk should receive added attention. However, as late as 1876 we find various authorities in different countries urging the direct sucking of a cow or an ass rather than any form of hand-feeding. Such advice is readily enough understood when we remember the prejudice against boiled milk and the incredibly foul condition of the milk supplies in the larger towns and in the country. There was no inspection of dairies, and most of the cows were in a filthy condition, many of them full of ulcers, their teats diseased, and their legs covered with tumors and abscesses. And this only about forty years ago.

In view of this fact it is obvious that many prepared substitutes for milk should be put on the market and numerous articles of diet were tried. In addition to those heretofore mentioned, we find sago-milk, arrow-root, salep (Pulv. orchis masculata), biscuits, gum-arabic, ground wheat and jellies. It was not until 1867, when Justus von Liebig introduced his food, that a real proprietary preparation came into extensive use. This was a liquid consisting of milk and wheat flour, to which was added malt and a small quantity of potassium bicarbonate. The disadvantage of this food was the fact that it had to be made daily. The next obvious step was the introduction of concentrated or dessicated cow's milk, the safest of these being a dry powder soluble in water (the tinning of condensed milk being at the time imperfect).

In this country the earliest treatise on pediatrics as an entity was written by the Rev. Thomas Thatcher in 1677. Its title is "A Brief Rule to Guide the Common People of New England How to Order Themselves and theirs in the Small-Pocks or Measles." This offers nothing new toward the advancement of infant feeding, but does inaugurate the pediatric literature of the new world.

Conditions were the same here as abroad. Progress in feeding was slow. The breast was always advocated, in fact it was a necessity in the wilderness, and generally lasted for at least two years. Bread-pap, of course, must have been widely used and wet nursing, owing to the unsettled nature of the country, was practised but seldom. The infant mortality of the time ran almost parallel to the European figures, being, if anything, less, probably due to the out-of-door life led. Medical instruction to physicians gave but little help to the mothers, and the feeding of the infants was carried on in a haphazard manner and on no scientific basis. Indeed, it was not until the reorganization of the New York Medical College in 1860 that there was started a special clinic for the diseases of children. It was due to the efforts of Dr. Abraham Jacobi, the dean of pediatrists in this country, that this was brought about. Other medical colleges quickly followed suit and by 1870 pediatrics, and infant feeding in particular, was finally started on a scientific basis.

The development of scientific infant feeding was essentially an American movement. Since the humble beginnings, made by Pepper and Meigs in the middle of the century, there have followed many foreign investigators, notably Czerny, Keller, Finkelstein, Meyer, Rubner, Escherich, Heubner and their contemporaries. The first natural step for these men to take was to make a careful comparative analysis of mother's milk and of cow's milk. Pepper and Meigs attempted the simple dilution of cow's milk, adding cream and milk sugar in sufficient quantity to make up the deficiency. It was soon recognized that there were certain inherent differences in cow's milk which made it hard for the infant to digest it, even though the percentages fed approximated mother's milk closely. Rotch, therefore, advanced the theory that it was essential to recognize the fact that certain digestive disturbances were due to fat, sugar, or protein, and that the correct way of treating these disturbances was to increase or to diminish any or all of the milk elements, as might be indicated. This was the beginning of the percentage, or so-called American method of infant feeding. The next step in the evolution was the home modification of milk, and Holt, Chapin, and a few others were its advocates. This included top-milk, milk and cream, whole-milk and skimmed-milk mixtures, which, when intelligently used, proved of great value. It was later recognized that any modification that failed to take into account the difference in the curd of mother's milk and of cow's milk would perhaps fail. Jacobi, and later Chapin, advocated the addition of cereal decoctions, or rice, barley or oatmeal gruels as a diluent. Dextrinized cereals, lime water, etc., were afterward advocated. The next obvious step was the complete sterilization of the milk, either by pasteurizing or by boiling. Under the leadership of Coit, milk commissions have been established in nearly all the large towns and cities and pure milk was assured.

Recently the Germans mentioned (Finkelstein, *et al.*) have adopted the so-called caloric method of feeding. This provides a sufficient number of heat units as required by the infant's weight. It has become more and more evident, however, that, everything else being equal, each child must be fed in an individual manner. It is by adaptation that the successful infant feeder is made.

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SEX DISTRIBUTION IN RICKETS—In the routine examination of school children of the ages of five to six and eight to nine years, 75,268 in number, and about equally divided between the sexes. J. Priestley (British Journal of Children's Diseases, 1915, Vol. XII., p. 173) noted marked signs of rickets in 2.04 per cent. of the boys and 1.13 per cent. of the girls. During three years of this five-year period even traces of rickets were recorded. The percentage then became 27.3 for boys and 16.3 for girls, bearing out, however, the greater prevalence among males.—*The American Journal of Obstetrics.*

SOCIETY REPORTS

THE PHILADELPHIA PEDIATRIC SOCIETY

Stated Meeting, Held October 12, 1915

Dr. Nathaniel Ginsburg reported the following case of a child of six years after recovery from esophagotomy for foreign body in the esophagus, and presented the patient, M. R., male, six years of age, schoolboy. Was admitted to Dr. Ginsburg's service at the Jewish Hospital June 28, 1915, with a history of having swallowed a foreign body forty-eight hours previously. On admission to the hospital the child had a temperature of 100$\frac{2}{5}$°, pulse 100, respirations 24. His mother stated that at the suggestion of a man he swallowed a thin metallic washer, which has about the diameter of a twenty-five cent piece. Swallowing was difficult, only liquids passing down the gullet without difficulty. The voice was somewhat brassy and respirations somewhat labored. Radiographic examination revealed the foreign body with a perforation in the middle lodged in the gullet on a level with the fifth cervical vertebra. The broad surface of the foreign body presented anteroposteriorly. Operation was performed June 29, 1915, under ether anesthesia.

An incision was made over the anterior border of the left sterno mastoid muscle, beginning about the middle of the muscle and passing down over the manubrium, about six inches in length. The dissection was carried down to the omohyoid muscle, and the carotid sheath, with its contents, was retracted laterally, and the thyroid gland was held to the median side—rotation of the trachea exposing the esophagus. The left recurrent laryngeal nerve was exposed in the field of operation and avoided. Two traction sutures of silk were inserted in the dorsal surface of the esophagus, which was lifted from its bed and a longitudinal incision made and the gullet opened. The foreign body in the upper angle of the wound was removed with forceps, and the incision in the esophagus was tightly closed with interrupted catgut sutures. The lateral aspect of the esophagus contiguous to the incision was packed with iodoform gauze and the incision in the neck was closed, the gauze projecting at the lower angle of the skin wound. The packing was removed from the lower angle of the wound on July 3d because of discoloration. Liquids taken by mouth exuded through the cervical incision and continued to do so for a period of three weeks following the operation. Except for a sudden rise in temperature on the nineteenth day following operation, which was of the septic type and which persisted for five days, recovery was uneventful, and at the present time the patient is well and attending school.

Dr. Eleanor C. Jones showed a colored infant with malaria and demonstrated the plasmodium of tertian malaria in the blood. The child was five months old, breast-fed, and weighed 13 pounds and 8 ounces. The mother took the baby to Arlington, Va., on July 24th, where the mother herself, and an older child, also contracted malaria. The baby was brought back to Philadelphia on August 5th, but had no clinical symptoms until August 12th, and then suddenly collapsed. It became very cold, lips blue, and the face looked pinched; after about twenty minutes it revived. Then a high fever set in, and lasted about four hours. It had these attacks every day for the first two weeks, and then every other day, and it also developed a severe diarrhea. It was brought to Dr. Esther M. Weyl's clinic, who made a clinical diagnosis of malaria, and transferred the baby to the children's ward on the afternoon of September 24th. A specimen of blood was taken and the "plasmodium vivax" found. The blood did not show any of the hyalin or segmented type of organisms, but only the granular form.

The temperature was 106.2° on the day of admission, and 5 grains of the bisulphate of quinin were administered on the 26th, three hours before the expected cold stage. The temperature in this paroxysm rose to 104°. Then 3 grains of the quinin were given three times a day for the next seven days, or until the baby left the hospital. The spleen remained slightly enlarged, but no more paroxysms occurred.

Dr. H. K. Hill said that he had expected to show a patient with malaria, but a positive culture for diphtheria from another child in the ward had quarantined the ward that afternoon. This boy of three and a half years, with a temperature of 105°, was admitted to the children's ward of the Howard Hospital with a tentative diagnosis of typhoid fever. The spleen was enlarged, but the child had not had a chill. The blood showed a great number of typical tertian plasmodia. The main point of interest was that for three alternate days the temperature reached its maximum height at 9 A.M.

Dr. J. R. Wells showed a twelve months' old child with acute epiphysitis of scurvy and demonstrated the lesion with X-ray pictures. This child came to him with a history of a sudden onset of pain in the right lower extremity and a doubtful history of injury to this leg. The child cried when the right limb was touched and refused to move it. This child had been breast-fed for a month and since that time had been on Eskay's Food. On examining the child he had found an undernourished, anemic appearance, with slight evidences of rickets, and the gums showed several blood-filled blebs. On examining the right leg no evidence of fracture or dislocation was found, only pain and some swelling. The treatment consisted of a straight posterior splint and a change of diet to a rational milk formula. After two days' treatment, during which the child seemed very comfortable, there was noticed considerably more swelling of the right leg, with an area of ecchymosis and a diagnosis of acute epiphysitis of scurvy was made. The only other treatment consisted of ½ ounce of pure cod-liver oil rubbed into the abdomen daily.

Dr. John F. Sinclair, in discussing Dr. Wells' case, spoke of an eight months' old baby, which had been under his care with acute epiphysitis, and in which no cause for this condition could be found except that several members of the family were suffering with diphtheria. He thinks it is possible to have epiphysitis caused by a diphtheritic infection, and that in this case it was the explanation.

Dr. G. Victor Janvier showed a child of three and a half years with probable pyloric stenosis. He had first seen the child outside of the hospital two years before and had been treating it since. The family history had no bearing on the present condition and the chief complaint was that the child was often unable to retain any kind of nourishment. The vomiting in this case was not projectile, but was described by the mother as "rolling up and rolling out." While examining the child the only noticeable thing was that it had just a shade of cretinoid expression, although no other signs of cretinism appeared. As yet there had been no gastric analysis in the hospital, although six months before an unsatisfactory one had been done which showed hyperacidity. The blood and urine reports at the present time were negative, although at different times this child had some casts, acetone, oxalates and indican in the urine. His vomiting at the present time was quite variable. At times he would keep down even solid food fairly well. At other times he would vomit everything given him.

Dr. E. E. Graham, in discussing this case, spoke of pyloric stenosis in older children as being a common condition. Personally he was convinced that quite a number of cases of pyloric stenosis occurred in children as old as this child and perhaps older. Routine examination of cases that vomit in older children, if supplemented by thick meals, show undoubted pyloric stenosis. The history of this case does not conform to many histories he has seen. In many cases the symptoms developed after three, four or five years of age.

Dr. J. P. Crozer Griffith said that the full history given added to the data which they have as yet been able to obtain in the hospital. The question of there being a stenosis had been in his mind an uncertain one. The age of the child was rather against it, although, of course, he knew that cases of stenosis had been reported more than once in children beyond this period. If there were a hypertrophic obstruction in this case, there certainly by now should have developed a dilatation of the stomach; and the X-ray examination, although not entirely conclusive, and although showing some retardation in the exit of bismuth through the pylorus, yet revealed no dilatation whatever. It showed, too, another interesting feature. There was observed, namely, for a moment, a temporary hour-glass contraction of the stomach. This, in connection with the fact that the patient seems to a certain extent a neurotic subject, would indicate that either there occurs at times intermittent spasm of the pylorus, or more likely that the vomiting depends upon some other motor neurosis of the organ.

Dr. John F. Sinclair showed 3 cases of ringworm of the scalp and a case of enlarged bronchial glands. The child with enlarged glands came to him when five years old with a history of a cough from very early life. In searching out the cause it was decided by several specialists that the adenoids and tonsils were not responsible. The ears were negative, except for a small amount of impacted wax. Finally he had some X-ray pictures taken. These plates he demonstrated and showed that in the region of the middle lobe of the right lung there were several enlarged glands and a few also in the region of the left upper lobe. This child was put on ascending doses of potassium iodid. Another X-ray picture taken some months later showed that these glands were gradually diminishing in size. There never were any physical signs.

Dr. Theodore LeBoutillier showed a case of pyloric spasm in a child of two and one-half years of age. "J. P." was brought to him in July, 1915, with a history of projectile vomiting occurring at irregular intervals. Weight at birth had been 9 pounds, but when first seen the child weighed only 6½ pounds. He had never done well on the breast, according to the physician at the dispensary where the child had been taken. It vomited frequently, but irregularly, and the mother said she had been told to take him off the breast and put him on a milk formula, which, however, did not improve the condition. Examination showed a poorly nourished, emaciated child, fontanel sunken, abdomen flaccid, gastric peristalsis very marked, the child having three typical attacks during the examination, the wave extending from the esophageal to the pyloric end. There was a history of retention of food for from six to eight hours, followed by projectile vomiting. No pyloric mass was palpable. The following treatment was ordered: The child was to be fed every hour and a half for eight minutes and also was given bromide and nux vomica and brandy every third hour before breast-feeding. During the first twenty-four hours after the treatment was started the child only vomited once, and during the second twenty-four hours but twice. The breast-feedings were gradually increased in length and then in the interval between feedings, until at the present time the child is being fed for twenty minutes every two and a half hours. It has continued to improve, gaining from 4 to 8 ounces in weight each week, and there has been no vomiting for one month. He is now five months of age and weighs 10½ pounds. An examination shows the child to be perfectly normal, with the exception of a slight enlargement of the spleen.

Dr. Harry Lowenburg showed a case of epilepsy, which has apparently benefited from the injection of crotalin. In the family history of this case he could discover no consanguinity or any history of other epileptics. The child had been fed for one year and three months on breast milk. At ten months of age the child began to have convulsions which were typical of epilepsy. The convulsions continued until the treatment was begun, three months ago. It is a backward child and has not yet talked. The hearing is apparently all right. In the beginning of the treatment he gave 1/300 of a grain of crotalin. At the present time he has increased the dose to 1/75 of a grain. He is afraid to further increase the dosage, as he has had one fatality in a child from giving a larger dose than this. In this particular case in which the child died there had been no convulsions for a year, but he had continued giving crotalin, when suddenly, on giving the child an injection, it developed typical rattle-snake bite symptoms and died. With the case which he was exhibiting to-night it had seemed to have done some good. It had had altogether from twelve to fifteen injections since the treatment was begun, and has had no more convulsions.

Dr. Wm. D. Robinson said that he thought that the present understanding of crotalin in epilepsy was that, while crotalin might control the convulsions for even a considerable length of time, the end result was the same, that is, the patient would begin to have convulsions again when crotalin was stopped. It probably did not act much differently than any like severe local inflammation usually does.

Dr. Wm. N. Bradley said that we should be very careful about what was said in referring to cures in epilepsy, and that no case could be considered as cured unless it had had no convulsion for a long time.

Dr. Wm. Drayton, Jr., spoke of a case of epilepsy which he had seen and which had been treated by crotalin. It was true that during the treatment by crotalin there were no convulsions, but the condition of the child was infinitely worse than if it had not been treated, as it was in a stuporous condition and was difficult to arouse and could not take nourishment.

Dr. Lowenburg, in closing the discussion, showed that the child was happy and was distinctly better and brighter. He thinks that in the case of which Dr. Drayton spoke the coma might have been due to bromides and not to crotalin, as Dr. Drayton did not know whether this child had been getting crotalin alone. He wanted it understood that he was not bringing up crotalin as an absolute cure for epilepsy, but he was simply exhibiting this patient as one who had been undoubtedly benefited by crotalin, and that crotalin in this case had stopped the convulsions. He could not say in what way crotalin acted.

Dr. Albert Strickler demonstrated some anaphylactic food reactions in a child of nineteen months with eczema of the face and involving the back of the ears. This child had been injected with fourteen different kinds of foodstuffs. The usual dose was 1/10 c.c. of the substance. Dr. Strickler has injected about 60 children with proteins of varying doses, and in all these cases 1/10 c.c. did not give any reaction in children in an apparently normal condition. No reactions are considered positive unless they remain for twenty-four hours. Because a child gives a positive anaphylactic reaction to a certain substance, it does not mean that the reaction of that substance is the cause of the child's condition, but this must be considered only as one part of the symptom-complex.

Dr. William Drayton, Jr., showed a case of spastic diplegia from the Orthopedic Hospital and Infirmary for Nervous Diseases with the following history:

A schoolboy of eight years came to the hospital with the complaint that he was unable to walk more than a short distance. The family history was negative. The labor lasted about five hours, and no forceps were used. The child was the second of three children, and was a bottle baby. It had had grippe. The mother says that about an hour after the child was born he developed "spasms." These were almost continuous for three days, since which time they have never recurred. He did not walk until four years of age; was three years old before he could sit up, and talked at one and a half years. During the last year, while in school, has grown better and walking has improved. On examination the child appeared very thin, very pale, and had constant but slight athetoid movements in both hands and legs. When standing unsupported he is in pretty constant movement. No spasm of the face either at rest or when talking, but the neck muscles are involved. He can lie down and get up from the floor without difficulty. Knee-jerks are difficult to obtain on account of the spasticity Stroking of the right sole causes marked slow extension of the great toe and fanning of the other toes. Stroking of the left sole causes fanning of toes without much extension. Left Achilles jerk is fairly marked, the right scarcely obtainable. No ankle clonus. Mental state good. Pupils react to light and accommodation. Tongue is clean and the teeth are O. K. Station is poor. Gait spastic, drags toes. Right arm is also spastic, left much better. Blood Wassermann negative. Spinal fluid Wassermann negative. In the spinal fluid there was no globulin and the cell count was 4. Eye ground examination was negative. Dr. Drayton said that about 70 per cent. of these cases showed positive Wassermann's and that even cases showing negative Wassermann's often improve with mercury and iodid. At the Orthopedic Hospital these cases are treated with massage and slow exercises. This particular child had improved somewhat under mercury.

Dr. Drayton also showed a case of clonic spasm of the muscles of the neck and back in a girl seven years of age. The father, one brother and one sister living and well. The patient was first thought to have chorea. The nervousness has been present ever since she was born. Physical examination showed a murmur heard at the apex systolic in time. The knee-jerks are increased. Lower extremities quiet. Wassermann positive. The child has a most peculiar swaying movement of the head, neck and back. He called attention to the perfect rhythmic motion of the muscles of the neck and back, which was always worse on observation and stopped when the child was asleep.

Dr. Arthur Newlin showed a case of spleno-myelogenous leukemia in a boy of ten years, and demonstrated the very much enlarged spleen, which extended as far as the pubis inferiorly and across the median line. The blood in this case showed 3,000,000 red blood corpuscles and 400,000 white blood corpuscles, of which 21 per cent. were myelocytes. Under small doses of benzol the white count had been reduced to 200,000.

Dr. David R. Bowen and Dr. Newlin showed a boy of nine years with epileptiform convulsions. The history stated that since the age of one year the boy had had weakness of the right side, the arm, leg and right side of the face being affected. The convulsive seizures also dated from that age, though the parents were unable to state which condition was noted first. The convulsions were general, now occurring about once a month. On examination he was found to have a slightly hemiplegic gait with some wasting of the muscles of the right arm and leg, with increased reflexes on the right side. His eye-grounds were negative, as was also the Wassermann reaction on blood and spinal fluid. The X-ray findings were demonstrated by Dr. Bowen. A pair of stereoscopic plates showed an oval density in the left fronto-parietal region. This was interpreted as a possible blood clot, with calcareous degeneration, and as a probable etiologic factor in both the hemiplegia and the convulsive seizures.

Dr. John Speese showed the X-ray plate of an unusual congenital deformity. The child had only one arm at birth, the other being completely absent. The examination of the arm shows complete ankylosis at the elbow, the forearm being in the position of extreme pronation. There are three fingers present, and, in spite of the lack of supination and the absence of motion in the elbow joint, the boy is able to use his arm and hand with considerable dexterity. With the idea of doing an arthroplastic operation on the elbow joint, an X-ray was taken in order to determine the condition of the joint. It was noted that the humerus was fused with the single bone present in the forearm and that there was absolutely no evidence of an elbow joint. On the opposite side there are several rudimentary bones present in the soft tissue of the shoulder representing the undeveloped bones of the arm. On this side there is a decided elongation in the region of the vertebra, indicating the formation of a cervical rib. On account of the fusion of the bones, in the region of the elbow joint, operative procedures were thought inadvisable.

Dr. John B. Carson showed a pathologic specimen of a congenital heart disease. This patient had given the following history:

Patient, L. L. M., aged four weeks at time of death. Admitted to the Babies' Hospital of Philadelphia on July 2, 1913, on the service of Dr. Alfred Hand, Jr., for opium poisoning, caused by an overdose of paregoric given by a caretaker. The child was discharged in good condition on July 4, 1913. It was readmitted on July 6, 1913, for enteritis. Was doing very well until July 13, 1913, when it had a sudden attack of cyanosis and died within a few minutes. The autopsy showed a well-developed, widely patent ductus arteriosus. The foramen ovale was also patient. Nothing else was abnormal except that the kidneys were slightly cystic. At no time was there a murmur or was a change in the percussion area of the heart demonstrable.

THE NEW YORK ACADEMY OF MEDICINE—SECTION ON PEDIATRICS

Stated Meeting, Held February 10, 1916

ROYAL STORRS HAYNES, M.D., IN THE CHAIR

A CASE OF COMPLETE CRETINISM WITH NORMAL MENTALITY

DR. WARD B. HOAG presented this patient. He said the title of the presentation had been given as a case of absolute cretinism with normal mentality; it would have been more nearly correct to say "normal mentality as the result of thyroid therapy." The patient was a little girl five and one-half years of age, whom he had first seen when she was three and one-half months old. At that time she had all the typical characteristics of cretinism. Her extremities were the shortest he had ever seen; her legs were like those of a tadpole, merely stubs. Her arms were equally short and her hands were short and stubby. Her head was covered with a thick mass of coarse, flaxen hair, her nose showed no development, her tongue protruded, her skin was dry and the flesh showed no resiliency; the abdomen was large. The child showed no animation, even hunger seemed to form no part of her desires. At the present time she stands forty inches in her shoes and weighed 43 pounds five weeks ago, which is more than the normal weight and height of the average child of her age. The mother has three older and two younger children, all of whom are normal, and she stated that this child shows nothing abnormal in her present condition; she talks and plays just as any other child. The labor was normal, except that it was rather precipitate, so that the absence of the thyroid could not be attributed to trauma. Thyroid medication had been begun at the time he had first seen the child, with one-quarter of a grain of thyroid extract twice daily. This amount was gradually increased until, for a time, when she was four years of age, she took 5 grains daily. At this time the mother was quick to observe a change in the child. She showed restlessness, loss of appetite, and the typical signs of excess of thyroid. She has now been getting 3 grains daily for some months. She eats well, plays well and is normally active. Her eyes are somewhat prominent, but the mother's are also, and they can scarcely be considered abnormal. Very soon after beginning the thyroid treatment the hair came out in great masses and the skin came off in sheets, two or three inches of skin coming off in a piece. Dr. Hoag thought she was worth while presenting as demonstrating the result of thyroid medication, together with persistent and careful attention on the part of the mother. The case showed that if one took a child 100 per cent. cretin early, and administered the amount of thyroid that nature intended the child to have, one could get a perfectly normal child, that is, if the child had no other defect in any other ductless gland secretion.

Dr. Thomas S. Southworth said that in this case he would put the stress a little differently from where Dr. Hoag placed it. He would say that the case showed what could be done if one got these cases early enough. They had all seen cases coming to treatment later in which a considerable degree of improvement was obtained, but the success obtained in this case was due to the early age at which treatment was begun, and the important point lay in getting these patients before the mental damage was done.

DIFFERENTIAL DIAGNOSIS OF THORACIC CONDITIONS BY ROENTGENOGRAM

Dr. Leon T. LeWald gave a lantern slide demonstration of the findings shown by the roentgenogram in pneumonia and pointed out the possibility of confusing these with old tuberculous bronchial lymph nodes. Another picture showed a condition that suggested miliary tuberculosis, but was probably a tumor, possibly a sarcoma of slow growth, for the condition had been present for at least two years. Such a picture was instructive in emphasizing the importance of taking into consideration the clinical history of the case and the possibility of making a mistaken diagnosis from the radiograph alone. Still other pictures were shown of anomalous ribs, cervical ribs and transposition of viscera. Dr. LeWald stated that he had observed 15 cases of transposition of viscera. Other slides showed foreign bodies revealed by the roentgenogram. In one case the foreign body had been lodged in the bronchus for seven years and the patient had been operated on for empyema. In another case a child was operated on for an encysted empyema and the condition was found to be due to an upholsterer's tack which had been swallowed two years previously. If one could not get a condition of this kind to heal it was advisable to subject the patient to roentgenologic examination. He had also found that when a patient claimed to have swallowed a foreign body it was well to take his word, and if one could not locate it by other means to make a roentgenologic examination. In making the radiograph in looking for foreign bodies it was a help to take plates in the lateral or oblique positions.

Dr. LeWald also called attention to the possibility of mistaking a beginning pneumonia for an acute appendicitis, and related an additional case, together with the case described before the Joint Meeting of the New England Pediatric Society, the Section on Pediatrics of the New York Academy of Medicine, and the Philadelphia Pediatric Society. (See American Journal of Obstetrics, and Diseases of Women and Children, January, 1916.)

THE DIAGNOSIS OF CONGENITAL PYLORIC STENOSIS OF INFANCY BY ROENTGENOGRAMS

Dr. Leon T. LeWald said that Dr. Downes had operated upon 77 cases of pyloric stenosis in infants. Forty-seven of the cases were in the recent series in which he performed the Ramstedt operation. Thirty cases were in the earlier series in which a gastroenterostomy was performed. In age the children ranged from fifteen days to four months. One case operated on by another surgeon was only ten days old. In Dr. Downes' series there were four males to one female. These children were usually normal at birth and very greedy feeders. Projectile vomiting occurred suddenly, with a rapid loss of weight. These signs should at once suggest the possibility of pyloric stenosis. Careful palpation and inspection reveal a tumor in the pyloric region and visible peristalsis. If, in addition to this, retention of the stomach contents can be proven by means of the stomach tube, diagiosis may be made. In doubtful cases the Roentgen ray is of the greatest assistance in determining whether obstruction is complete or incomplete and may turn the evidence for or against operation.

As to the choice of operation, it has been Dr. Downes' and Dr. LeWald's observation that the Ramstedt operation of simply splitting the hypertrophied muscle allows the stomach to empty in a more physiologic manner, while the performance of the gastroenterostomy is apt to produce too rapid emptying of the stomach and intestinal disturbance; this, according to Dr. Downes' statement, has been observed in 50 per cent. of the cases in which the latter procedure was employed.

In speaking of the various degrees of pyloric obstruction and the ingenious theories which have been advanced to account for its origin, Dr. LeWald said one was forced to the conclusion that, after all, little had been gained by these controversial theories and that they did not tend to assist very materially in an elaboration of the diagnosis, nor to establish a definite form of treatment, which was, after all, the important and practical end which was sought. Certain cases which exhibit the classical symptoms, namely, projectile vomiting, steady wasting, constipation, excessive stomach peristalsis, in addition to a palpable nodular tumor in the pyloric region, we must regard as cases of true pyloric stenosis. Enough cases have been reported with marked hypertrophy of the circular fibers of the pylorus, and a corresponding diminution in the lumen of the viscus at this point, as is shown in the illustration on the screen, that it would seem irrational to deny the existence of this type, which may be termed surgical. On the other hand, cases are reported without any palpable tumor, but otherwise having all the usual symptoms in varying degrees of severity. It is perhaps in these that the greatest difficulty arises in determining the best method of procedure and in how far they may be surgical. The suggestion is given by the majority of writers that this group should be treated medically until the time when they resist medical management, as evidenced by stationary or falling weight. They may then be subjected to laparotomy, with its high degree of hazard, the operator being necessarily uncertain as to his method of procedure until he has satisfactorily explored the stomach. If a hitherto undiscovered tumor is found at the operation, the infant must be able to withstand a considerable degree of shock incident to the performance of a posterior gastrojejunostomy. If no tumor is found little is gained and possibly much lost by subjecting the impoverished infant to a loss of blood and further depletion of its natural existence. If, therefore, by the use of modern methods we can so complete our diagnostic means that we can, with a degree of positiveness, determine whether or not a given case shall be operated upon, we shall be making an advance worth while. Notable achievements have recently been made in Roentgenology, especially in the use of bismuth in the alimentary tract. Modern apparatus, with the intensifying sheets, enables the radiologist to make instantaneous exposures, thus securing with the minimum of effort negatives of value. Whether the stomach in early infancy is simply a dilated pouch intended for the accumulation of a quantity of food, which is quickly acted upon by the gastric juice and immediately allowed to pass out through the pylorus, or whether it performs its share of the preparation of foods for the higher and more complex process of digestion in the duodenum, is a question for future study. The fact that we may observe the exit of food into the duodenum within a minute or two after its intake tends to show that we have been overvaluing this portion of the alimentary tract. That liquid foods begin to be expelled normally in a very short time after they are taken into the stomach is very helpful in our diagnosis of conditions dealing with some forms of pyloric obstruction, for if it can be demonstrated with a degree of exactness, by a series of radiographs, that the milk is retained for a greater length of time than in the normal stomach, as is shown by the bismuth shadows, we can determine with a fair degree of certainty with what type of obstruction we are dealing. Since such striking results can be obtained by this means, it seems manifestly unfair not to early obtain a series of radiographic pictures in every suspected case, so that an infant suffering from a true tumor and with a lumen so small as to practically occlude the passage of food into the duodenum may early be given over to the surgeon while its physical condition is still good. On the other hand, cases of pyloric spasm, even of marked degree, but without tumor formation, can be differentiated, since the time and the amount of the food passing through the pylorus can be seen, and thus the diagnosis and even the prognosis can be fairly well fixed. The findings have been so illuminating that the prophecy may be made that in the future every suspected case of pyloric obstruction will be subjected to radiographic study before a plan of treatment is determined upon, just as to-day no surgeon would think of putting up a fracture without the use of the X-rays.

A CASE OF DEATH FOLLOWING INGESTION OF ONE DRAM OF CAMPHORATED OIL

DR. SIDNEY V. HAAS said that the almost universal use of camphorated oil as a household remedy made a knowledge of the danger attending its internal administration important. Camphorated oil was a preparation containing 80 per cent. cottonseed oil and 20 per cent. camphor. The literature abounded in reports of deaths due to swallowing this preparation. Death had resulted from the ingestion of 7½ grains, and, on the other hand, an instance was reported of an eighteen months' old child who had taken a teaspoonful upon a full stomach and was then given a teaspoonful of castor oil and all went well. The case which he wished to report occurred in a baby three weeks old. Three-quarters of an hour before he was brought to the hospital a teaspoonful of camphorated oil had been given, being mistaken for castor oil. The baby had had a slight bronchitis and the castor oil had been prescribed for internal use and the camphorated oil for external application. The child was cyanotic and looked very ill. The stomach was washed out and the house physician who did it thought he obtained more than a teaspoonful of camphorated oil. The child was then put into the ward and did not appear very sick. The maximum temperature was 100.6°F., and the child only showed signs of bronchitis, which had been diagnosed before the camphorated oil was administered. After forty-three hours the child died very suddenly in a cyanotic attack. This was in accord with observations previously made, that death usually occurred within forty-eight hours. The urine in this instance showed a trace of albumin. C. Happich, who experimented on rabbits and guinea pigs, found that the degree of tolerance for camphor depended upon the presence of glycuronic acid, which was produced in the pulmonary circulation by the combination of sugar and oxygen. In states of inanition this substance was much reduced, and the individual became more susceptible to the toxic action of the drug. This might account for the toxicity of camphor in young infants and weakened children.

RECURRENT HILUS INFILTRATION: AN UNUSUAL FORM OF TUBERCULOSIS IN CHILDREN

Dr. Murray H. Bass and Dr. Harry Wessler presented this communication. They stated that our knowledge of the pathogenesis and the anatomic varieties of tuberculosis in childhood had undergone considerable change during the past decade and at present it was recognized that the clinical types of pulmonary tuberculosis in the first few years of life were quite distinct from those of adults. The typical apical lesions commonly found in adults were not seen until late in childhood, while affections of the bronchial lymph nodes were the rule. There were, however, forms of tuberculosis whose localization in the lungs of children was just as typical as that in adults, the area of lung involved being determined by the presence of the diseased bronchial nodes. The authors reviewed briefly the generally accepted conception of the origin and distribution of tuberculosis in the infant and child, based on the work of Hamburger, Gohn and Albrecht, and then proceeded to describe the lesion which he was especially considering, namely, recurrent hilus infiltration. This form of tuberculosis was an extension from the lymph nodes and occurred frequently enough to warrant its incorporation as a clinical entity in the great group of tuberculous infections of the lung. Sluka had encountered it thirty-eight times within a few years and Eisler had also reported an identical clinical picture. For a knowledge of the morphology of this lesion they were indebted to the Roentgen ray. This lesion occurred in the vast majority of instances on the right side and its point of predilection was the lung in the immediate vicinity of the fissure between the upper and middle lobe. Beginning with its base at the hilus, where a dark shadow of tuberculous nodes was visible, a fairly opaque shadow of homogeneous density extended outward into the lung for a considerable distance, gradually fading into the normal lung tissue. The resulting infiltration was triangular in shape, its apex being near the axilla. Its lower margin was sharply defined by the interlobar fissure. The latter was evidently thickened and the seat of a pleurisy, as it could usually be seen extending quite into the axilla beyond the limit of the infiltrated area. Various interpretations had been applied to these shadows. Sluka believed that it indicated a direct infection of the pulmonary tissue from the caseated lymph nodes at the hilus with a resulting tuberculous infiltration of the lung. This seemed likely, since the primary lesion of Gohn was commonest in the first year of life, and if it was responsible for this form of tuberculosis we would encounter it at an early age. It was therefore remarkable that Sluka, in his series, never found it before the age of two years and their experience had been similar in the Roentgen examination of children. The infiltration did not remain constant in size or appearance, and this was perhaps the most remarkable fact in regard to these cases. The process suffered striking variations in its extent at different times. The Roentgen examinations made at intervals of one month might show at first a wide area of infiltration, and at the later examination nothing might be left but the thickened interlobar fissure. The latter usually persisted for a long time as a thin, sharp line running horizontally across the upper part of the right lung from the inner end of the fourth costosternal junction to the axilla. Such a sequence of infiltrated and normal lung might be repeated several times and justified the appellation "recurring hilus infiltration"; there was a correspondence in recurrence of the signs and symptoms of the patient. Children in whom this typical hilus involvement had been found were usually brought to the physician on account of general debility, loss of weight, slight cough or night sweats. The condition was found in children between the ages of two and eight years, but did not occur in infancy. Physical examination of the chest was usually negative, unless the process had involved a considerable mass of lung tissue. This point was of the greatest importance, since it emphasized that in such debilitated children with positive von Pirquet test X-ray examination was imperative. This was all the more necessary, since it had been shown that this particular lesion was in many cases a curable one, provided appropriate treatment was followed. In favorable cases, and the majority seemed to be of this type, there was a distinct regression, the symptoms all becoming milder, and the X-ray coincidently showing a diminution in the amount of lung involvement.

The essayists reported 2 cases illustrative of a number that had come under their observation.

In closing, they stated that the exact pathogenesis of these lesions was rather obscure, for corroboration by autopsy was impossible, since the majority of the children recovered and those that went on to a fatal termination presented the picture of a general caseous involvement of the lung. The histories of many of the cases had shown that before the onset of the condition the child had had either measles or pertussis, and the theory had been advanced that possibly there was at this time not only a lowering of the resistance to tuberculosis, but also that local conditions in the bronchial glands might be at fault. The fact that regressions take place needs explanation. It is difficult to conceive of a true tuberculous infiltration coming and going in this fashion and the most plausible theory seems to be that the underlying pathologic process is one of an inflammatory exudate about the tuberculous hilus. Such exudative processes have been described by Fraenkel, who ascribed them to toxic action and showed that they might resolve, leaving very few traces behind them. This paper was illustrated by lantern slides.

SOME FACTORS AFFECTING THE INCIDENCE AND CASE MORTALITY RATE OF MEASLES

Dr. J. G. Wilson, Assistant Surgeon United States Public Health Service, read this paper. (See page 261.)

CHLOROMA: A REPORT OF 2 CASES, TOGETHER WITH THE ROENTGENOLOGIC FINDINGS

Dr. Everett W. Gould and Dr. Leon T. LeWald stated that, although this disease had been described since the beginning of the nineteenth century under the names chloroma, chlorolymphoma, and green cancer, only a comparatively few cases had been reported; they therefore thought it advisable to record the following 2 cases, which appeared in the pediatric service of St. Luke's Hospital. It seems fairly well proven by Dock and Warthin that the condition arises from a hyperplasia of the parent cells of the leukocytes, especially in the red marrow bones, and that it also occurs in any of the leukoblastic tissues of the body, and that, therefore, neoplasm-like formations are found in the spleen, liver, lymphatic glands, and, in fact, in almost all the tissues of the body. An analysis of the cases reported tends to show that chloroma occurs much more frequently in children and particularly in males. The chief clinical features which characterize the disease are exophthalmos, which is produced by a retrobulbar lymphoma; swellings of the temporal and occipital regions, due to the involvement of the cranial bones; enlargement of the spleen and lymphatic glands throughout the body, but especially in the cervical region; and a severe and progressive anemia, causing weakness, fever, and emaciation. Hyperplasia of the bones of the skull undoubtedly begins in the marrow of the cranial bones, but soon involves the periosteum and the dura matter, forces the sutures apart, fills up various foramina of the skull, and by pressure upon nerves which emerge from the brain through these openings may cause blindness, deafness, pain, or other symptoms referable to the nerves involved. Hayden states that exophthalmos is the first symptom noted in a majority of the 14 cases which he reviewed; it was also an early symptom in most of Dock's cases. However, in some cases there has been no exophthalmos. The involvement of the cranial bones causes swellings, which may be so rapid in development and so soft that they simulate a cystic condition. The pain and swelling in various joints of the body, which have been frequently described and which have led to an early diagnosis of rheumatism in several instances, have been proven by postmortem examination to be due to this same hyperplasia of the marrow cells in the adjacent long bones. In the various reports nearly all the bones of the body have been cited as being the seat of this change. The blood picture of chloroma varies greatly in the reported cases. The anemia is believed to be due to the rapid proliferation in the bone marrow of the leukoblastic tissues resulting in the crowding out of the elements from which the red blood cells are derived. The anemia, therefore, depends upon the deficient production of red cells rather than upon any toxic destruction of them. The hyperplasia of the leukoblastic elements leads to the frequent appearance in the blood stream of large numbers of white blood cells of various types, and has led to its classification as a form of leukemia. In most of the reported cases this characteristic leukemic picture has been found at some time during the course of the disease, especially during the later stages. The predominating type may be any one of the normal or leukemic types of the leukocytes, or the hyperplasia of the parent cells may reach such a stage that the new forms do not reach the blood stream in such numbers as to give the picture of a leukemia. During the time that the cases herein reported were under observation the blood picture was never that of leukemia, but the time during which the blood was watched represented only a small part of the duration of the disease. The name "chloroma" was given to the disease because of the peculiar green color frequently seen in the tumors removed from the body, and which may also be found in any of the new growths, or even in a blood clot within the heart, though it is a more prominent characteristic of the hyperplasias of the bone marrow. The nature of this coloring matter is still unknown.

In regard to the histologic characteristics of this disease, observations recently made by pathologists show that it does not belong to the lymphomata, carcinomata, or lymphosarcomata.

Guembel emphasizes the difference between chloroma and sarcoma. He points out the fact that in chloroma it is impossible to find the primary growth, that there is an absence of giant cells, there is no bone formation, and circumscribed metastases in internal organs are wanting. Klein and Steinhaus perhaps first observed that the tumors of chloroma were largely composed of cells of leukoblastic origin. They found that neutrophile cells, especially myelocytes, constituted a large part of the tumor mass. Large and small lymphocytes with eosinophile granules were frequently predominant, and they therefore classified the disease with the leukemias. Warthin shows that in his cases at least the tumors which involved the vertebrae and the prevertebral tissues were primary in the bone marrow spaces, that they infiltrate or grow through the lymphatics and blood vessels or break through the bone and secondarily involve periosteum and surrounding tissues. Section shows that the normal marrow tissues are almost entirely replaced by cells of the large lymphocyte type, most of them showing eosinophile granulation. Transition forms of various kinds are numerous, but the whole vertebral tumor is made up of cells of leukoblastic origin with a scanty and delicate tissue reticulum, and with little evidence of new blood vessel formation. Nodules of similar histologic structure were found in various organs of the body arising from intravascular proliferation and seeming to have little influence on surrounding tissues except by pressure and atrophy. There is little manifestation by the organ involved of a reaction in the nature of a resisting proliferation of the tissue cells, or the development of a reticulum and blood vessels.

Of the 2 cases coming under the observations of the authors, the first was a female child, three and one-half years of age, and the second a male child, five years of age. In neither instance was an autopsy obtained, but the Roentgen ray findings appear to be fairly characteristic, especially in regard to the proliferation of bone tissue in the skull, producing a separation of suture lines. In the second case there were characteristic changes in the long bones. The process seemed to be essentially a rarefaction and proliferation in the medullary cavities combined with a subperiosteal change lifting the periosteum over a variable distance from the surface of the shaft. The absence of epiphyseal changes distinguishes the condition from infantile scorbutus and rachitis. The combination of the periosteal changes with the changes in the medullary cavity distinguishes the condition from a myelomatous lesion. The extent of the process distinguishes the condition from sarcoma. The changes in the medullary portion of the bone appeared to be distinctly different from those of syphilis. The gross pathologic changes in these cases were in exact accord with those described by Warthin. As far as the writers have been able to ascertain, these are the first cases in which the Roentgen-ray findings have been recorded.

Dr. Leon T. LeWald exhibited lantern slides of the radiographs. He said the radiograph of the first patient, made January 29, 1913, showed marked enlargement of the mediastinal lymph nodes with slight displacement of the trachea to the right. Another radiograph taken three days later confirmed the finding of enlargement of the mediastinal lymph nodes. Examination of the skull on February 5th showed a distinct separation of the coronal suture, producing a wedge-shaped gap measuring 1 cm. at the vault. Radiographic examination of the head on February 12th confirmed the previous finding of separation of the coronal suture and also showed a separation of the parietal sutures. Stereoscopic examination confirmed the findings of separation of the suture lines of the skull, including the occipito-parietal regions.

The first radiographic examination of the second patient, the boy of five years, made October 22, 1913, showed a distinct separation of the suture lines, especially marked in the region of the coronal suture and the parietal sutures. The separation of the frontal suture measured about 2 cm. at the vertex. Examination of the chest showed an extensive involvement of the mediastinal lymph nodes. The diaphragm was pushed upward on both sides, indicating a distinct enlargement of the liver and spleen. The bones of the upper extremities showed marked changes of a very peculiar type. The medullary portion of the long bones showed a peculiar mottling due to rarefied areas. The periosteum was distinctly raised from the surface of the bone over the greater portion of the shaft. The peculiar combined involvement of the medullary cavity and the periosteum has not been observed in other bone lesions, and as the gross and pathologic findings agree with those found in chloroma a diagnosis of chloroma seems justified when these are taken in conjunction with the history of the case. Radiologic examination of the lower extremities showed an involvement of the long bones exactly like that observed in the upper extremities.

DEPARTMENT OF ABSTRACTS

ORIGINAL CONDENSATIONS OF CURRENT PEDIATRIC LITERATURE
BY THE EDITORS AND THE FOLLOWING ASSOCIATES

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EMERSON, W. R. P.: ACUTE OTITIS MEDIA IN INFANCY AND EARLY CHILDHOOD: AVOIDABLE MISTAKES IN DIAGNOSIS, PREVENTION, TREATMENT. (The Boston Medical and Surgical Journal, October 21, 1915.)

The author points out the fact that acute otitis media is the most frequently overlooked affection in infancy and childhood. Its prevalence is due to the relative increase in frequency of nasopharyngeal affections in early childhood, and the readiness with which the necessary sinuses are blocked, which, in the case of the Eustachian tube, leads to the formation of a closed cavity in the middle ear, with consequent infection and abscess formation. The symptoms of otitis may be those of pneumonia, of meningitis, or simply an intensification of symptoms due to the disease which the otitis complicates. As the disease may lead to mastoiditis, edema of the brain, or to septicemia, failure to make an early diagnosis may be fatal. Five typical cases follow, which illustrate common sources of errors in diagnosis:

CASE 1. Alice D., age two years, previously well, began to be feverish and vomited on the morning of December 13th. She put her hand to her right side, saying "Hurt." Her bowels had not moved for two days. She had a history of digestive upset the previous summer and Thanksgiving. At five o'clock in the afternoon her temperature had increased to 104° and she had a convulsion. Her attending physician made a diagnosis of an inflammatory process in the abdomen and considered an exploratory operation. She was seen in consultation at 6 P.M. Her physical examination was negative except for signs of adenoid tissue in her throat, and the presence of marked abdominal tenderness. An examination of the right ear showed slight congestion along the handle of the malleus. The ear was opened. The patient almost immediately fell asleep. Next morning the temperature was 100°. At two o'clock it was 102.6°, and at six o'clock 105°, and the patient had another convulsion. An examination of the other ear showed a condition of the drum similar to that of the first. The second ear was opened. The next morning the temperature was normal and remained so. There were no further symptoms except for a slight discharge, which continued for forty-eight hours.

Case 2. Stephen G., age three years, was brought into the out-patient department of the Boston Dispensary. His temperature was 104°, his mental condition clouded. He had general tenderness of the muscles, retraction of the head. Kernig's sign was present. In the chest there were signs of bronchitis. A diagnosis of early meningitis was made *in spite of the withdrawal of 20 c.c. of clear fluid by lumbar puncture and a normal cell count.* A consultation in the out-patient department was held and a second diagnosis of bronchopneumonia with cerebral symptoms made. He was admitted to the writer's service in the hospital, where the ears were examined for the first time. Both drums showed very slight congestion along the handle of the mallei. A double paracentesis was done, and a drop or two of pus was found in each ear. Next morning the temperature was 100°. The cerebral symptoms had disappeared. The temperature gradually returned to normal, the bronchitis cleared up in eight days, and the patient was discharged with a diagnosis of acute bronchitis complicated by a double otitis media.

Case 3. Edward H., age two years, eight months, had been sick ten days with measles. On Thursday he was doing well. On Friday he began to manifest signs of abdominal pain, which seemed to be paroxysmal. Hot fomentations were applied to the abdomen for most of the night with no relief. The next day the ear drums showed very slight congestion in the upper quadrant, so slight as to make a diagnosis of an inflammatory process uncertain. On the fourth day his condition grew worse; accordingly a free incision was made in each drum, and a drop of pus seen in each ear. Eight hours later the child showed some improvement. The paroxysmal pain disappeared and in twenty-four hours the patient was comfortable. During this time the temperature varied from 101° to 102.5° and showed no rise with the exacerbation of symptoms. The ears discharged moderately for two weeks, when the patient had apparently recovered from the otitis. However, the prostration was so great that the child was not able to speak for five weeks. On recovery from his sickness it was found that his speech and mental development were put back practically a year. It seems reasonable to believe that the dangerous character of this illness was due to the otitis rather than to the measles.

CASES 4 AND 5. Catherine D., age three years, nine months, had had a cold for a week with slight cough. She became feverish and restless. Her temperature was found to be 102.2°. Her physician made a diagnosis of slight bronchitis. The mother asked the physician to examine the ears, which he did not do, but tested them with a watch, pronouncing them all right. The next day the ear drum ruptured and was followed by a profuse purulent discharge, which continued for eight days, the patient's temperature ranging from 99° to 101°. On the eighth day the other ear was examined only as a matter of routine, but found bulging. It was opened under ether, and at the same time a wider opening was made in the first ear. The temperature the next morning was normal and remained so aside from rising one degree each afternoon. Both ears discharged profusely for about two weeks.

During this time a sister, Beatrice, aged twenty months, was convalescing from bronchopneumonia. After two weeks of normal temperature she suddenly showed restlessness; the temperature rose to 103.5°. The left ear drum showed very slight congestion in the upper quadrant. Measures were adopted to open the Eustachian tube without success. Four hours later the temperature had risen to 104.2°, respiration 52. The ear drum was opened by a curved incision; a slight bloody discharge followed. No pus seen. The next morning the temperature was 99°; all symptoms disappeared. There was a slight serous discharge for two days and no further symptoms.

The following points are of interest: In none of the 5 cases were there symptoms of earache. In 2 cases abdominal, in 1 meningeal, and in 2 general, associated with fever. In all of the cases diagnosis was made by routine examination of the ear drums, not by localized pain or tenderness. In 3 cases, where the drums were opened promptly, without waiting for bulging or pus, the duration of the condition was only three days. From statistics, based on over 2,000 cases of scarlet fever, measles and diphtheria, it was found that otitis media was clinically diagnosed in less than 15 per cent. of the cases, and in 252 fatal cases otitis media was found in 92 per cent. Among these autopsy cases were also found 59 cases of mastoiditis, of which only 6 or 8 were recognized during life. The reports also show that 80 per cent. of the mastoid cases and a large number of the middle-ear cases showed edema of the brain. This report clearly shows that a routine examination of the ears should be made at every visit of the physician to his patient.

In regard to the prevention, the author advocates in all primary infections of the nasopharynx either liquid albolene or a 10 per cent. solution of argyrol dropped into each nostril three times a day. Steam inhalations are helpful. An even temperature must be maintained in the room, and the child should be protected from strong winds and dust. In older children an ointment applied inside the nostril is advocated. This is made of menthol, gr. vij; eucalyptol, gr. vij; lanolin, ʒvi; and vaselin, ʒij. Irrigations of hot salt, menthol sprays and swabbing the throat with iodin, ♏xx to an ounce of glycerin, may be of use. When the drum membrane begins to show congestion along the handle of the malleus, the following treatment should be given to open the Eustachian tube: A mixture of adrenalin, solution ♏iv, and cocain 0.5 per cent., followed in five minutes by a few drops of 20 per cent. argyrol solution, should be allowed to flow through the nostril on the affected side, tipping the head so that the solution flows toward the orifice of the tube. This should be repeated in three hours if there is still pain. When, however, the symptoms increase, the drum should be incised without waiting for bulging or pus. The drum is incised in the lower posterior quadrant curving upward to the attic. The other ear should be carefully watched, as a double otitis is frequent.

H. R. M.

LEVIN, JOSEPH J.: A CASE OF TRAUMATIC RUPTURE OF THE SPLEEN SUCCESSFULLY TREATED BY SUTURE. (The Medical Journal of South Africa, December, 1915, p. 82.)

A native boy was kicked by his master and also punched in the abdomen. He felt faint, had severe abdominal pain, and immediately vomited blood. Twenty-four hours later an incision was made into the abdomen with the idea of discovering a ruptured liver. Along the upper anterior border of the spleen a tear was discovered two inches long. Four deep No. 4 catgut sutures stopped the hemorrhage, and, except for distention following the operation, which proved difficult to control, the convalescence was uneventful and the boy was discharged twenty-eight days after operation. S. M.

BOOK REVIEWS

An Autobiography. By Edward Livingston Trudeau, M.D. Illustrated. Philadelphia and New York: Lea & Febiger. 1916.

In the foreword to this book is quoted G. K. Chesterton's review of Balfour's "Life of Robert Louis Stevenson." In it Balfour tells us that when Stevenson was a little boy he once made the following remark to his mother: "Mother, I've drawed a man. Shall I draw his soul now? . . ." Dr. Trudeau, in his attempt at self-delineation, has drawn *both* a man and that man's soul. Real human documents of the autobiographical type are rare, but here is one that should be read not only by medical men, but by those of the laity who are in perfect health, and especially those who are suffering from disease. As a young man in New York Dr. Trudeau loved the good things of life—athletics, horseback riding, rowing, etc. He loved the irresponsible life of youth, with no serious purpose for the future. Suddenly he was pulled up short, soon after he had been married, by what was then (1871) considered an absolutely incurable disease. As he expresses it: "I think I know something of the feelings of the man at the bar who is told he is to be hanged on a given date, for in those days pulmonary consumption was considered absolutely fatal." He must have temporarily lost all hope and faith, and, indeed, as he himself says, it was years before he ceased to rebel and struggle against fate. The merest chance took him to the Adirondacks, which were then a wilderness, with no houses except hunting cabins. There it was that he discovered and preached the two basic principles in the treatment of tuberculosis—fresh air and rest. The trials and tribulations of the man in those early days are admirably portrayed. The wilderness presented almost insurmountable difficulties, which were gradually overcome. The scientific part of tuberculosis was not neglected, and Dr. Trudeau was the foremost exponent of Koch's theories, although in the light of present-day knowledge his experiments were groping in the dark, but *were* a step in advance. His personal life was not without its sorrows, as he lost a daughter and a son, both from the same disease with which he was afflicted. An especially interesting chapter is the one devoted to the visit of Robert Louis Stevenson to Saranac in 1887. Another is the one describing the start of his laboratory. Dr. Trudeau's life is typified by Mercié's statue, "Gloria Victis," which represents a young gladiator who has just received his death blow while facing his foe. As he falls, his broken sword still in his hand, the figure of Victory, with great outstretched wings, swoops down and carries him upward in her arms. A great life devoted to others, stricken at last by an implacable foe, yet offering to untold generations the hope of cure and of relief from suffering.

A PRACTICAL TREATISE ON INFANT FEEDING AND ALLIED TOPICS FOR PHYSICIANS AND STUDENTS. By HARRY LOWENBURG, A.M., M.D., Assistant Professor of Pediatrics, Medico-Chirurgical College of Philadelphia; Pediatrist to the Mt. Sinai Hospital; Pediatrist to the Jewish Hospital; Pediatrist to the Jewish Maternity Hospital; Consulting Pediatrist to the Hebrew Orphans' Home; Assistant Pediatrist to the Medico-Chirurgical Hospital and to the Philadelphia General Hospital; Formerly Instructor of Pediatrics, Jefferson Medical College. Illustrated with 64 text engravings and 30 original full-page plates, 11 of which are in colors. Philadelphia: F. A. Davis Company, Publishers. English Depot, Stanley Phillips, London. 1916.

Up-to-date, practical and personal, expresses in a few words the reviewer's opinion of this new treatise on infant feeding. The author, as he states in his preface, has studiously avoided gleaning various ideas from different authors to express his views. Rather does he draw from his own personal experience. The text engravings and the full-page plates are splendidly done, the colored plates in particular being unusually fine. Under the title of Allied Topics he includes infantile atrophy, rickets, scurvy, vomiting, constipation, diarrhea, spasmophilia, exudative diathesis and pyloric obstruction.

ARCHIVES OF PEDIATRICS

MAY, 1916

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EDITORIAL

THE AMERICAN PEDIATRIC SOCIETY

The Archives of Pediatrics presents with a great deal of pleasure a special and very full report of the meeting of the American Pediatric Society held at Washington, D. C., on May 8th, 9th and 10th. Year by year this meeting grows in importance, representing as it does the best minds and the best constructive work in pediatrics in America. This recent meeting was no exception to this rule. Various interesting symposia were presented, notably ones on vaginitis, scurvy and chorea; and numerous case reports and original articles made the meeting one of extreme interest. After reading the report of this meeting, which appears in the present issue of the Archives of Pediatrics, one cannot but feel that the future of pediatrics must lie in this country, and especially in the younger men, who yearly are swelling the ranks of pediatrists.

ORIGINAL COMMUNICATION

THE MANAGEMENT OF SUMMER DIARRHEA *

BY ARCHIBALD D. SMITH, B.A., M.D.

Visiting Pediatrist, Brooklyn Hospital; Visiting Physician to Children's Ward,
Bushwick Hospital; Consulting Pediatrist, Bushwick and East
Brooklyn Dispensary

In June, 1909, I was one of four to take part in a symposium on "Summer Diarrhea" before the Medical Society of the County of Kings. Since that paper was read it is interesting to note that a good many advances have been made in the knowledge of the bacteriology and environmental influences and feeding of summer diarrhea.

As far as prevention is concerned, it is well to take this opportunity to emphasize the importance of breast nursing. Every mother should be encouraged to nurse her baby, and when we realize and can impress on the mothers that artificially-fed babies are subject to diarrhea more than breast-fed babies in the ratio of 2½ to 1, the tremendous influence of breast feeding in preventing summer diarrhea receives adequate credit. Meteorologic influences, such as high temperature and high humidity, especially if prolonged, undoubtedly irritate the nervous system and initiate metabolic disturbances, which lower the resistance to infection and make food injury possible. Therefore we see why it is important to keep the baby cool and comfortable, and protect it from the direct rays of the sun, but insist on as much fresh air as possible. Keeping the baby comfortable also includes the use of proper clothing, and during the heated terms as little clothing as will keep the abdomen and feet warm is the proper clothing. Clean clothing is also as important as the lightness of the clothing. Plenty of cool water should be given by mouth between the feedings, and one or two cool sponge baths may be given with advantage each twenty-four hours. The milk supply should be clean, and protected from contamination until inside the baby. This includes screening to protect from flies, as it has been shown that twice as many cases of summer diarrhea occur in

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* Read before the Brooklyn Pediatric Society, May 24, 1916.

babies who are not properly protected from flies. In Brooklyn we are fortunate in being able to obtain a clean raw milk, namely, certified milk, and properly handled it is the only proper food for the normal healthy baby. If we look into the matter of the food a little further we find that there may be a temporary inability on the part of the child to assimilate the food, or there may be overfeeding of a proper food, or there may be feeding with an improper food, or there may be a fermentation or putrefaction going on. Examination of the stools for the bacterial origin may show one of the strains of dysentery bacilli, either the true Shiga bacillus, or the Flexner bacillus, or the Strong bacillus, or the Y bacillus of Hiss. In addition to the dysentery bacilli the gas bacillus, bacillus aerogenes capsulatus of Welch, may be found. Then the colon bacillus may assume a pathologic nature, and any of a number of other organisms, such as the bacillus proteus vulgaris, Morgan's bacillus, streptococci, staphylococci, typhoid or paratyphoid bacilli may occur.

The general principles of treatment are the same for all cases, and so distinct that there is no mistaking them. In applying them we are to remember that we are dealing with an intoxication arising from the intestinal contents, and that an inflammatory condition of the stomach or intestines may or may not be present. These principles are:

(1) The thorough emptying of the stomach and intestines.

(2) Rest in bed and rest to the stomach and intestines.

(3) Supplying of fluid to compensate for the great drain.

(4) Elimination of the toxins.

(5) Measures to allay the inflammation.

To these general principles must be added

(6) The treatment of special symptoms.

(1) *The Thorough Emptying of the Stomach and Intestines.*—Vomiting sometimes empties the stomach completely. If any doubt exists the stomach should be washed out. Persistent vomiting is usually controlled by washing with the fluid at 110°. In the severe cases of the cholera infantum type the stomach is always to be washed out. When the fever is high 1 or 2 ounces of water may be left in the stomach. Lime water may be introduced with benefit if the stomach contents are very sour. In

children over two years of age stomach washing cannot be employed without undue struggling, the very thing we wish to avoid. As a substitute for stomach washing, boiled warm water may be given freely. It is usually vomited promptly and may cleanse the stomach.

For emptying the small intestine cathartics alone are available. Calomel will usually suffice in the mild cases. It is a mild intestinal antiseptic and increases the flow of bile. Up to one year 1/10 grain is given every one-half hour for ten doses. Between one and three years 1/8 grain every one-half hour for ten doses. From three to six years 1/6 grain every one-half hour for ten doses.

Castor oil should follow the calomel in all severe cases. It can be given one-half hour after last dose of calomel. Up to one year, 1 dram; one to three years, 2 drams; three to six years, ½ ounce. It is frequently vomited, but is so adhesive that it usually will not all be vomited. It should be repeated three times if vomited. It sweeps the whole intestinal canal, is very certain and its after effects are soothing.

Saline cathartics are useful if the movements are small in amount and we wish to aid in elimination. They should not be used when the patient is greatly depressed, with sunken fontanel, low temperature, and evidences of great need of water. Milk of magnesia is prompt and antacid, but is mild and not to be relied on in serious conditions. Sodium sulphate is better borne by the stomach than any of the other salines except milk of magnesia. It is best given in repeated small doses—10 grains in 1 dram of water to a child of one year.

Colon irrigation should be used in all severe cases to supplement the action of cathartics. It should be done by the physician himself or by a competent nurse two or three times during the first day. Afterward once daily is usually enough. The best solution is normal saline, one tablespoon of salt to two quarts of water. The bag of the fountain syringe is held about two feet above the child. After expelling the air and filling the catheter, No. 15 American scale, with saline, the catheter is inserted just within the sphincter and the water turned on. As it flows the catheter is gradually pushed upward to a distance of ten or twelve inches. The water distending the intestine in advance of the catheter makes its introduction easy, and prevents the catheter curling on itself in the majority of cases. The washing should be continued until the solution returns quite clear. Gentle kneading of the abdomen should be continued during the early part of the irrigation to facilitate the passage of the water into the upper part of the colon. When the temperature is low, with symptoms of collapse, the normal saline should be at a temperature of 110°. If the temperature is high, it can be reduced by using the solution at a temperature of 80°F.

(2) *Rest in Bed and Rest to the Stomach and Intestines.*—Rest to the stomach and intestines is a *sine qua non* of the treatment. Emphasis should also be placed on keeping these patients quiet in bed. Even if the child is able to walk it should not be allowed to do so.

Rest for the stomach and intestines is accomplished by withdrawing all food for from eight to twenty-four hours. The withdrawal of food should be complete. In all severe cases digestion is practically at a standstill, and food given at this time will only increase the difficulties of the position. Boiled water is to be given cool and in small amounts at frequent intervals.

(3) *Supplying of Fluid to Compensate for the Great Drain.*—In the mild cases this can be accomplished by giving cool boiled water frequently. In the more severe cases the colon will absorb a considerable quantity of fluid if, after the initial thorough cleansing, the irrigation with normal saline is continued, allowing the water to flow in and return slowly, and using as much as 1 or 2 gallons. In the severe cases and those of the cholera infantum type, the only efficient method of supplying the great amount of fluid lost is by hypodermoclysis. At least half a pint should be given in the course of twelve hours, and sometimes more is better. The injection is given into the cellular tissue of the abdomen or buttocks slowly.

(4) *Elimination of the Toxins.*—Elimination is assisted by the fluids supplied. The colon irrigations assist in the elimination from the bowels, the kidneys and the skin. Occasionally salines are useful to assist elimination from the bowels. Bathing is useful to assist elimination from the skin.

(5) *Measures to Allay the Inflammation.*—Rest to the stomach and intestines is important, and has been more fully discussed previously. After the digestive tract has been thoroughly cleaned out and the toxemia lessened, the inflamed intestinal mucous membrane should be covered with bismuth. To ac-

complish this bismuth subnitrate must be given in large doses, at least 1 or 2 drams to a child of one year. It is insoluble in water, and is best given suspended in mucilage of acacia. It usually blackens the stools.

Intestinal antiseptics are useful even if they do not render the whole intestinal tract antiseptic. Certainly it is reasonable to believe that they inhibit bacterial growth, and experience leaves no doubt that they are beneficial. Salol is the best, as it leaves the stomach unchanged, and is decomposed in the intestines into carbolic and salicylic acids. It has the disadvantage of causing vomiting sometimes. It should be given in doses of 1 or 2 grains every two hours to a child of two years. Bismuth is also antiseptic, though this action is secondary to its protective influence on the mucous membrane.

Astringents are indicated only in the catarrhal diarrhea which follows the acute symptoms. Tannalbin is the most useful. It is insoluble in the stomach, but is slowly decomposed in the intestines. It therefore causes no gastric disturbances, but is gently, yet firmly, astringent on the entire intestinal mucous membrane. Patients under one year are given 15 to 30 grains in the twenty-four hours. Sometimes it can be used with opium. It is insoluble in water, and should therefore be given in gruel or suspended in mucilage.

Opium is used much too frequently and often at the wrong time. Its indications are a continuance of the frequent movements and severe pain. It is contraindicated until the stomach and intestines have been thoroughly cleaned out, when the number of discharges is small, and especially if they are offensive and when cerebral symptoms with high temperature are present with scanty discharges. It finds its best use during convalescence, when the taking of food is followed by a movement of the bowels. To a child of one year 5 minims of paregoric may be given, always in a separate prescription, to be repeated until the desired effect is obtained. In cases of the cholera infantum type, with large fluid movements and symptoms of collapse, morphin should be given hypodermically, 1/100 grain to a child one year of age, remembering always the contraindications.

(6) *The Treatment of Special Symptoms.*—Acid fermentation in the stomach, manifested by vomiting of sour material and eructation of gas, is best met by the alkalis, lime water, bicar-

bonate of soda or chalk mixture. Either of the first two may be added to the water used for washing out the stomach when indicated.

Prostration is present in the majority of the cases. It is best relieved by whiskey, diluted with at least eight parts of water. It can frequently be added to the water given to allay the thirst. Half an ounce of whiskey to a child one year old is the maximum amount as a rule. If needed, tincture of strophanthus, 1 or 2 minims every four hours, may be added to the whiskey. If stimulants given by the mouth are vomited and the case is a severe one they are to be given hypodermically. Whiskey, ether and camphor in oil (1 in 10 solution) may be used. Strychnin is not to be used when the nervous symptoms are those of irritability with a tendency to convulsions. The dose is 1/300 grain to a child one year old. In cases of the cholera infantum type morphin, 1/100 grain with atropin 1/1,200 grain hypodermically, is sometimes life-saving. In connection with these cases hypodermoclysis finds its most certain indication.

Fever must be controlled in some cases. Only tub baths are to be relied on for this purpose. They are continued for about ten minutes, as often as every hour if the case demands it. The child is placed in water at 100°, and this is gradually cooled with ice to about 80°. Gentle friction over the entire body is kept up during the bath. Cold water rectal irrigations are a valuable aid in lowering temperature. Iced cloths or an ice cap may be applied to the head. The feet should be kept warm. The cold pack can often be substituted with advantage for the bath. The child is stripped and rolled in a sheet wrung out of water at 100°F. Ice may now be rubbed over the outside of the sheet in front and behind. The rubbing with ice may be repeated in a few minutes if necessary. The child is then rolled in a blanket without the removal of the pack. Heat may be needed to the feet. Sponge baths are of some value.

Abdominal distention can be relieved by colon irrigations containing turpentine. Turpentine stoups and mustard compresses to the abdomen are of aid.

Tenesmus can be controlled by means of starch with or without opium. The anus and prolapsed rectum may be covered with 5 per cent. cocaine ointment.

For cold extremities and subnormal temperature hot mustard baths and the mustard pack are useful to establish reaction.

Antitoxin Treatment.—While it is true that bacteria of many different kinds are directly or indirectly responsible for the symptoms in a large proportion of cases, in only one form is there any hope of success from the antitoxin treatment. This is in infection with the true Shiga bacillus, the bacillus dysenteriæ. The true Shiga bacillus and its allied forms are now recognized as playing a part in the bacteriology of the diarrheal diseases of children in this country. The true Shiga bacillus is found in this country, though not so frequently as in Europe. The Flexner type is more common here. There is no doubt that the true Shiga bacillus does produce in culture media a definite soluble toxin, and that an antitoxin is produced in the blood of immunized animals which is valuable as a specific curative agent. It is also fairly well settled that the other closely related varieties of the bacillus dysenteriæ, such as the Flexner type, do not produce a soluble toxin, and against these types there is no satisfactory antitoxin. To be of value, therefore, the antitoxin treatment must be used in those cases of infection with the true Shiga bacillus. Unfortunately, at the present time it is impossible to distinguish the cases of infection with the true Shiga bacillus clinically. It is associated with almost every sort of intestinal disturbance, except cholera infantum, of which no cases have been studied. Bacteriologic examination must be resorted to in order to isolate the bacilli from the stools. They are agglutinated usually by the blood of the patient. Many of the unsatisfactory results from the use of the antitoxin in children can be explained on this basis, namely, that the antitoxin was used in cases infected with the allied organisms rather than the true Shiga bacillus.

Feeding.—It is in regard to the feeding that more advances have been made than in the medicinal treatment. This is due to the fact that bacteriology has shown us that the Shiga and allied organisms are proteolytic, and that the gas bacillus thrives on sugar. We have seen that all food is stopped for twenty-four hours. It is possible in this time to determine whether the gas bacillus or other organisms are responsible for most of the symptoms. A simple clinical test is given below for this determination. If it is determined that the gas bacillus is not responsible for the symptoms, we begin feeding with a sugar solution, 5 per cent. lactose. To this feeding are quickly added cereal gruels and fruit juices. If, on the other hand, we find that other organisms than the gas bacillus are responsible for the symptoms and in all purely mechanical food diarrheas we begin with Finkelstein's eiweissmilch or lactic acid milk, fat-free. This is diluted one-half or two-thirds with barley water and the strength gradually increased as tolerance is shown. In the older children other things are added later, such as scraped beef, zwiebach, cereals. Where no examination of the stools is practicable it seems wise to begin feeding with the eiweissmilch. If no improvement is shown in twenty-four hours, then the eiweissmilch can be stopped and the opposite course taken of feeding with the 5 per cent. lactose solution. It is to be remarked in passing that the majority of cases will be successful on eiweissmilch or lactic acid milk.

159 Herkimer Street, Brooklyn, N. Y.

JAUNDICE OF THE NEWLY BORN—Bang (Hospitalstidende, Copenhagen, June 30, Vol. LVIII., No. 26, pp. 637-660) describes the various methods for determining the content of the serum in bile pigment, and relates that in his extensive research on the subject he found that the blood in the umbilical cord always contained a notable amount of bile pigment. The findings were positive in all the 24 infants examined, even at once after birth, consequently icterus in the newly born may be considered a physiologic condition. He found it the same in infants delivered by Cesarean section, so the birth trauma cannot be incriminated. In all the children examined the proportion of bile pigment in the blood constantly increased during the first few days, but it began to subside after the third, fourth or fifth day, although there was still a positive reaction in all on the tenth day. It is thus only a question of degree between the newly born with or without clinical icterus. All have the bilirubinemia to some extent, and this fact demolishes some of the theories that have been advanced to explain icterus neonatorum. He used the Gmelin-Sunde technic for his tests, that is, the blue-green ring that forms at the line of contact between the serum and the reagent, which is a mixture of 300 parts nitric acid and 0.06 parts sodium nitrate. The interval before the color reaction occurs is an index of the intensity of the icterus. The number of red corpuscles increases rapidly after birth. He theorizes to explain these facts. —*Journal of American Medical Association.*

AMERICAN PEDIATRIC SOCIETY

Twenty-eighth Annual Meeting, held at Washington, D.C., May 8, 9, 10, 1916

THE PRESIDENT, DR. ROWLAND G. FREEMAN, OF NEW YORK, IN THE CHAIR

PRESIDENTIAL ADDRESS

DR. ROWLAND G. FREEMAN, New York, delivered this address. He said the pediatrician had a powerful and valuable therapeutic agent in fresh air, that was moving, cool, out-of-door air. The effect of this was to stimulate the appetite, induce quiet sleep, bring color to the cheek, and increase the resistance of the organism to infection. Subsequent investigators have not confirmed the claim that fresh, cool air materially raises the blood pressure, so that they seemed to be driven to the position that the favorable action of fresh air on the organism was due to the absence of the deteriorating effects of the air of closed rooms. In the fresh air the body had the advantages of normal conditions. The idea that air that had been breathed by other people was unhealthy probably arose from the unpleasant odor of closed and crowded rooms and from the symptoms elicited by extremes of this sort. It had been observed that the symptoms produced by closed places were depression, headache, thirst and difficult breathing. The elements producing these symptoms were supposed to be a diminution of the oxygen and an increase in the carbon dioxide, with the possible appearance in such an atmosphere of a really poisonous product from the expired air. Experiments for the most part discredited this theory. The amount of oxygen in crowded, closed rooms is not depleted to a danger point, nor is the amount of carbon dioxide increased to such a point. Efforts to find a poisonous element in such air have been made from time to time with negative results. In 1883, Hermans, of the Hygienic Institute in Amsterdam, concluded that the discomfort of crowded places was due to the inability of the body to cool itself in a hot, moist atmosphere. These symptoms then were due to stagnant, hot, moist air surrounding the body, and would be accentuated in people wearing heavy, impervious clothing that prevented access of moving air to the skin. It was evident that they should wear as little clothing as was consistent with comfort. The result of these elaborate experiments was, in brief, that fresh air was good, not because it supplied oxygen, not because it was over-loaded by carbon dioxide, not because it contained a poisonous element, but because it allowed the body to exist under such circumstances that it could control its moisture and temperature. The traditional fear of drafts and the habit of many people of living in close, hot rooms had to be combated. The cold air of winter was much more stimulating and produced better results in children than the mild air of spring and autumn. The best results from fresh air were obtained by keeping the children out of doors day and night. Out-of-door sleeping porches, enclosed on three sides and roofed, but open to the south, furnished the best fresh air at night, while in the daytime balconies and rooms without heat and windows wide open supplied the air they needed. It should be seen that the children were not sealed in heavy, impervious covering so that the skin was unable to rid itself of the heat and the moisture. In all the acute infectious diseases, excepting perhaps in measles and scarlet fever, Dr. Freeman believed that there was now a general acceptance of the advantage of fresh air. Where it is impossible to obtain such complete out-of-door exposure, the best substitute in cold weather has seemed to Dr. Freeman to be in rooms with cheese-cloth screens in the windows. These allow a moderate access of air without the presence of drafts. Other methods of ventilation consist in patent ventilators put under the lower sash. It is only during the existence of marked changes of temperature between indoors and outdoors that epidemics of colds exist, for during the summer we have practically an immunity to colds, and colds only occur when our houses are closed. In New York the epidemics of colds usually begin in November and December.

Premature infants who show a subnormal temperature in cool air should be kept in an air temperature that will preserve the normal body temperature. This warm air must be a freely-moving, warm air, rather than the dead air found at the bottom of a box. Dr. Freeman was not sure whether such cold, fresh-air treatment was applicable to cases with kidney lesions or with severe heart lesions. The most important application of this fresh-air treatment is to build up the vitality and resistance of frail children to disease. Dr. Freeman believes that rachitis is entirely a disease of housing. It exists, not in tropical countries, where people live out of doors, but in colder climates, where people house themselves in winter. The symptoms develop in winter only and the severe cases that we see are entirely confined to the children of races that have been accustomed to warm climates, where the families do not house themselves in winter. Italians and colored people and other people accustomed to tropical climates should be warned that they must give their children fresh air in winter if they would have them survive and develop properly. In all the acute infectious diseases Dr. Freeman thinks there is now a general acceptance of the advantage of fresh air, excepting, perhaps, in measles and scarlet fever. In tuberculosis and in pneumonia there is no question of its advantage.

It would seem that some explanation is due as to why, if all these statements are true, children are still housed and many adults have a panic if a breath of cold air strikes the back of their neck or their bald heads, while children who are brought up without fear of cold enjoy it wherever it strikes. The supposed production of catarrhal inflammations in adults by exposure to cold air, if it really exists, exists only on account of suggestion. These people have been brought up to such a fear of fresh air that every infection of the upper air passages to which they succumb they attribute to this health-giving influence. It is sincerely to be hoped that many of the coming generation may be brought up under different ideas and may be less dependent on hot, offensive, stagnant air for the supposed comforts of life. There is evidence enough to show that many diseases are favorably influenced by this simple and safe measure. Many children are allowed to become sick from housing and children may be seen dying in closed wards of many of our best hospitals who might have been saved had they been put out of doors.

RECENT PROGRESS IN OUR KNOWLEDGE OF THE PHYSIOLOGICAL ACTION OF ATMOSPHERIC CONDITIONS

Dr. Frederic S. Lee, New York, presented this paper. He said that some time ago, in the physiological laboratory of the Columbia School of Medicine, Dr. Eastman and he made experiments, the results of which had changed their ideas concerning the physiologic action of atmospheric conditions. It had long been the custom to ascribe to chemical components of the atmosphere the bad effects of living in air that had already been breathed by human beings. The discovery of oxygen and carbon dioxide early in the last century gave a great stimulus to this notion, and it became firmly fixed in the minds of chemists, physiologists and physicians, as well as the educated masses, that air that had once been breathed was chemically vitiated and rendered unfit for human use by the lack of oxygen, the accumulation of carbon dioxide, and the presence of an organic poison of unknown nature. No sooner had this notion become widely accepted than the laboratories began to demonstrate the inadequacy of the supposed proof of the notion. To cut a long story short, it is now known that, except under very unusual circumstances, the harmfulness of respired air is not due to its chemical components. The harmfulness of living in confined air is found in certain physical rather than chemical features—the air is too warm, too moist, or too still; and if it has not these physical features it is not harmful. We all have sat in crowded assemblies, we all have experienced the hot, humid, still days of an American summer. We all know the effects of such air on our sensations. In what respect is hot, humid, still air harmful? To answer this question we must consult the records of many researches, chiefly on human beings, but partly on animals, that have been undertaken since Hermans, more than thirty years ago, observed that in crowded theatres and churches his own bodily temperature rose. The most recent of these researches is that of the New York State Commission on Ventilation, which has been in progress for the past two and half years and is not yet completed. Notwithstanding the fact that man is supposed to be a homothermal organism, there is a certain relationship between his bodily temperature and the temperature of his environment, even under the ordinary conditions of living. This has been shown by the New York Commission, which found that during the months of June and July the rectal temperature of its subjects at 8 A.M., living in their own homes, was conditioned by the average atmospheric temperature of the previous night. The variation of the bodily temperature was about 1°F for 20°F. of atmospheric temperature, although it is probable that the degree of variation can be modified by the clothing. The Commission further found that, whatever the bodily temperature of its subjects might be, it was lowered by confinement in an atmosphere of 68°F. and 50 per cent. relative humidity, and raised by confinement at 75°F. with the same humidity, or still more by 86°F. with 80 per cent humidity. The relation between bodily temperature and external cold has not been so fully studied, but enough is known to warrant the statement that, in normal individuals at least, the bodily temperature to a considerable degree can be controlled by controlling the temperature and the humidity of the surrounding air. It is altogether probable that the same is applicable to febrile diseases. External temperature exerts likewise a definite effect on the circulatory system. The rate of the heart beat is increased in warm, humid, and decreased in cool, dry air. The New York Commission found the average rate of its subjects confined in an atmosphere of 86°F. and 80 per cent. relative humidity to be 74, and in an atmosphere of 86°F. and 50 per cent. humidity, 66. Eastman and Lee have seen the pulse rate increase by 39—from 67 to 106—as the temperature of the air surrounding the subject rose from 74° to 110° F. and the humidity from 58 to 90 per cent. Atmospheric conditions exert on the respiratory system effects of various kinds. On the respiratory rate a moderate degree of heat and humidity seems to be without effect, but there is some evidence that more extreme conditions cause a quickening of the breathing, and this is probably accompanied by more shallow respirations. The more extreme conditions, too, appear to result in a lowered concentration of carbon dioxide in the air of the pulmonary alveoli, although Dr. Lee cannot as yet quote figures to demonstrate this. The matter is, however, important, since a lowered carbon dioxide signifies an increased content of hydrogen ions; in other words, increased acidity in the blood. Dr. Eastman and the writer are now investigating this point with much interest. They find that the mucous membrane of the respiratory tract is markedly affected by atmospheric conditions. Exposure to heat causes increased swelling, redness and secretion in the nasal mucosa, and these effects are more marked when the humidity of the air is high. Exposure to cold reverses the effects. Little can be said at present regarding the action of atmospheric conditions on the nervous system. The New York Commission has expended much time and effort in endeavors to detect a possible influence of atmospheric variations between moderate limits on the ability to do mental work. The subjects were given such psychological tests as cancelling arithmetic figures, adding figures, mentally multiplying three-place by three-place figures, typewriting, and more complex mental performances which involve choice and judgment. The range of atmospheric variation was from a lower limit of 68°F. and 50 per cent. relative humidity, and an upper limit of 86°F. and 80 per cent. humidity. In some cases the air was kept quiet, in others in motion by electric fans. In neither the young men nor the young women subjected to these tests could there be detected any relation between atmospheric conditions and either the accuracy or the amount of mental work that was performed. The relation between atmospheric conditions and metabolic phenomena is not yet elucidated. A topic that is inviting is the possible relationship between atmospheric conditions and bacterial infections. Most of the experimental observations that have here been made relate especially to the action of temperature on the course of infections, and it has generally been found that high external temperature with accompanying pronounced increase of bodily temperature checks the progress of infections that are already existing. Somewhat lower temperatures (30°F.-35°F.), on the other hand, seem to favor the multiplication of the bacteria and the advance of the disease. By way of a general summary it may be said that, when an existing external temperature is fairly comfortable to the individual, an elevation of it, especially when such elevation is accompanied by an increase of humidity, is deleterious. The deleterious effects are more pronounced when the air is stagnant. All experimentation and observation go to demonstrate that a moderately dry and cool air in motion constitutes the most physiologically helpful aerial envelope of the body. "In these days we hear much of 'fresh' air and its merits. We have fresh-air funds, fresh-air schools and fresh-air babies. All are commendable; but while giving to our funds, opening our schools and putting our babies out of doors, let us clearly understand what constitutes fresh air. The freshness of so-called 'fresh' air lies not in more oxygen, less carbon dioxide, less organic matter of respiratory origin, and the hypothetical presence of a hypothetically stimulating ozone, but rather in a low temperature, a low humidity, and motion. To what extent should fresh air be used as a therapeutic measure? Here intelligent experience, and not opinion without experience, is the only guide. It cannot be denied that where intelligent experience has been applied to the topic of fresh air as a therapeutic agent, the use of fresh air has been invariably extended. But no one has a right to maintain that it is a panacea."

SOME STUDIES ON THE MODE OF INFECTION IN PYELITIS IN INFANCY

Dr. Richard M. Smith, Boston, presented this paper. He said there had been two antagonistic theories to explain the mode of infection of the kidney in pyelitis of infancy; one maintained that that infection took place through the urethra, bladder and ureters; the other that the infection came by means of the blood and lymphatics. The disease was much more common in the female than in the male, the proportion being nearly 3 to 1. The organism most frequently causing the disease was the colon bacillus. Directly against the ascending theory of infection were the facts that colon bacilli had never been shown to pass up the normal unobstructed ureter and that the colon and tubercle bacilli had been introduced repeatedly into the bladder and in the presence of a normal mucous membrane and were excreted without causing damage of any kind. Ascending infections occurred only in the presence of obstruction to the outflow of urine and would not occur if the sphincter of the ureter was normal. The theory of infection of the kidney by the blood and lymphatics rested upon much surer ground. Dr. Smith said that he had made 71 cultures from the vagina, vulva and urethra of 40 infants and young children. One infant six hours old and all over eighteen hours, with the exception of 1 infant six days old, showed growth from the vaginal culture. All the vulvar and urethral cultures were positive. The first organisms to appear were streptococci and staphylococci, and then the small bacilli, not colon. Colon bacilli were found in vaginal cultures of infants as early as the fifth day. Dr. Smith said that his findings were in accord with those of Schmidgall, who found the vagina of the newborn sterile ten out of thirteen times and by the second day a profuse growth of cocci. The colon was isolated twelve times out of twenty-one in newborn infants after the second day.

It was shown also that the vaginal secretions did not kill off the pathogenic organisms. A possible source of infection with colon bacilli or other bacteria is certainly present in the female vulva, urethra and vagina and a slight trauma might easily accomplish the entrance of organisms into the lymphatic vessels and blood and thus to the kidney. The source of infection in pyelitis, in the majority of instances, males and females together, is the gastrointestinal tract. Some cases might arise from infection in the skin, teeth or tonsils or in some local septic process. Many cases in females accounting for the greater number in this sex as compared with the males may arise from bacteria entering the blood often via the lymphatics from the urethra, vulva or vagina.

Dr. Henry F. Helmholz, Chicago, said that the question whether there was a reflux of urine from the urethra into the bladder might have a bearing on the question of infection. In 3 out of 12 cases examined by the X-ray he had been able to show that there was a reflux of urine from the urethra into the bladder.

DIET AND GROWTH IN INFANTILE SCURVY

Dr. Alfred F. Hess, New York, presented this paper, in which he called attention to the fact that scurvy almost never developed among breast-fed babies, but was encountered among those who were fed on cow's milk and more especially those who received in addition some of the proprietary foods, which were so commonly resorted to in the preparation of milk formulæ. There had been considerable difference of opinion as to whether pasteurized milk could induce the scorbutic condition. In its report, in 1912, the Commission on Milk Standards stated that pasteurization did not destroy the chemical constituents of milk and that it was not altered by exposure to heat under 145°F. for thirty minutes. In order to test the validity of this statement, Dr. Hess made a test among a certain number of inmates of an infants' home, where all babies were fed on Grade A pasteurized milk which had been heated to 145°F. for thirty minutes. The babies had been receiving orange juice in addition. This was discontinued. No other change in the diet was made. Almost all the babies who did not receive orange juice developed a more or less marked form of scurvy, whereas those who continued to receive orange juice remained entirely free from this disorder. Most of these infants had been in the institution from birth, so that their condition both before and subsequent to the change could be thoroughly observed. The results of this investigation were published some two years ago and were questioned by some, who were loathe to believe that pasteurized milk could in any way lead to scurvy and hence the observations were extended somewhat during the subsequent year. The results were the same, so the writer felt safe in saying that a diet of pasteurized milk led to the production of scurvy in infants unless some antiscorbutic food was also given. The scurvy met with in infants fed on pasteurized milk was, as a rule, not of the florid type met with in infants fed for months on a proprietary food, but might be described as latent or rudimentary. There was a gradually increasing pallor, a failure to gain in weight, the development of some petechial hemorrhages, and, in more marked instances, the subperiosteal hemorrhages. It would seem probable that this insidious type of the disorder was far more common than was generally recognized by physicians and that there were many infants suffering from slight nutritional disturbances which might be ascribed to this cause. When the pasteurized milk was replaced by raw milk, the scorbutic condition improved, although it might be added that raw cow's milk was by no means comparable to orange juice as an antiscorbutic. It was not to be inferred from these conclusions that the use of pasteurized milk was fraught with danger, but merely that it was an incomplete diet for babies and must be given with antiscorbutic food. There were also secondary factors contributing to the development of scurvy, such as the individual variation depending upon hereditary characteristics; in other words, upon the amount of antiscorbutic material which the infant brought with it when it came into the world. Secondary food factors also seemed to play a part. Malt preparations seemingly predisposed to scurvy and it seemed that there is an intimate relationship between the development of scurvy and the amount of carbohydrate in the dietary. The sovereign cure for scurvy was orange juice, which was efficacious even when boiled for ten minutes; potato, one of the best antiscorbutics for adults, might be used in infant feeding where orange juice could not be readily obtained. For this purpose milk could be diluted with potato water—one tablespoonful of mashed potato to one pint of water—instead of the usual cereal decoction. In connection with this work observations were carried out to ascertain the effect of infantile scurvy on growth. This study embraced an interval of one year or more. Three periods might be distinguished in this investigation—a preliminary period of about three months, during which time the infants were weighed daily and measured every two weeks; a period embracing four months, during which time the infants received a liberal diet of pasteurized milk and cereal, which differed from the previous period only in the fact that no orange juice was given; and an after period, lasting about six months, which dated from the time when orange juice or some other antiscorbutic was again added to the food. During the period when the antiscorbutic was discontinued particular attention was given to furnishing a sufficient quantity of food, and more cereal was given or the strength of the milk mixture was increased. It was found that, although the infants continued to gain in most instances for a few weeks following the discontinuance of the orange juice, they soon reached a stationary plane and for months were unable to rise above this level, but increased in weight promptly when the antiscorbutic food was again added to their diet. It was very probable that infants ceased to gain in weight at about eight months of age, during the third quarter of the first year of life, for the want of this essential addition to their food, and failed to progress until mixed feeding was begun, some months later. At present the rule might be said to be to add fruit juices to the infant's diet at about the sixth month, but it would seem that it should be given as soon as possible. There was no reason why a baby should not receive orange juice when a month old, and there were strong arguments in favor of such a procedure. A number of infants in this group were also measured, and, as a result, it was found that scurvy not only had a direct effect upon the weight, but also upon the growth in length. This fact was of greater biologic interest than failure to gain in weight, for growth in length was a physiologic impulse to which the individual clung with great tenacity, and which was rarely affected even when other functions were held in abeyance. Lack of growth, however, did not always play an essential part in the constitution of scurvy. Orange juice was found to be a corrective for the lack of growth as well as for the failure to gain in weight in this series of cases.

Dr. L. Emmett Holt, New York, said that it had been his impression for several years that the number of cases of scurvy was on the increase and this impression had been confirmed during the past year. They all realized the advantages of pasteurized milk, but that it had certain disadvantages was sometimes ignored. There was a tendency to require the pasteurization of all milk. This would be a mistake and it was time that they should express their disapproval of such a course. There were instances where raw milk was inadequately certified; such a condition of affairs should be corrected, but it should not be made impossible for one to obtain pure raw milk if that was required in any particular case. In considering the subject of scurvy they must take into consideration the fact that other factors beside pasteurized milk played a part; there was the factor of hereditary predisposition which must be given due weight. After all, there were comparatively few cases of scurvy produced by pasteurized milk among the poor, because it was quite customary to give fruit, vegetables and other foods to babies at a comparatively early age. It had been his experience that ten or twelve years ago nearly all the cases of scurvy could be traced to proprietary foods, and now they nearly all came from boiled milk. The number of cases was undoubtedly increasing or we would not be having this discussion. Physicians should be prepared to recognize scurvy when it came under their observation. During the past year Dr. Holt said he had seen 4 cases that were not recognized until epiphyseal separation had taken place. We must emphasize the fact that if pasteurized milk was used we must also use an antiscorbutic and use it early and continually.

Dr. Charles Herrman, New York, said that Dr. Hess had said that orange juice retained its antiscorbutic properties even when boiled, while milk did not. This raised the question whether something more than heat might not enter into the problem.

Dr. Samuel S. Adams, Washington, D. C., said that he was opposed to the commercial pasteurization of milk, and he hoped the Society would take this question up and protest against the tendency to pasteurize all milk. The commercial pasteurization of milk was dangerous. Within the last ten days 4 cases of scurvy due to pasteurized milk furnished by the City of Washington had come under his observation. In one instance he asked a dairyman to send raw milk. He did not do it, and when asked why said because the raw milk was bad. It would be quite as reasonable to buy a rotten steak because the butcher tells us it will not hurt us if it is cooked as it is to buy dirty milk and think it is all right because it has been heated. Dr. Adams said he was not necessarily opposed to the home pasteurization of milk.

Dr. A. D. Blackader, Montreal, said he would like to emphasize the importance of pasteurized milk as a cause of infantile scurvy. He said he had had two instances in infants in which the symptoms were obscure, chiefly nervous symptoms associated with a lack of growth, but there were none of the classical symptoms of scurvy. In both of these cases there was a rapid disappearance of the symptoms following the administration of orange juice. He thought when he saw these cases that he had found something new, but he would give Dr. Hess credit for having shown that this subacute form of scurvy was due to a deficiency of vitamines in the food of these young infants.

DR. HENRY L. K. SHAW, Albany, said he would like to say a word in defence of pasteurized milk. He was in a position to see the reports of the various milk-borne epidemics which had occurred as result of the use of raw milk. In New York State there had been seventeen epidemics directly traceable to milk. Septic sore throat and not tuberculosis was the dangerous disease conveyed by raw milk. In one of these epidemics there had been 70 cases of septic sore throat. Some cases of this infection had been very serious and even fatal, and he thought that a comparison of the evidence would show that the danger of scurvy was not comparable to that of septic sore throat. Scurvy is a disease very easily cured or prevented by the use of orange juice and could be safely added to the infant's diet after the third month.

DR. PERCIVAL J. EATON, Pittsburgh, said he wanted to support the statement that Dr. Hess had made. Commercially pasteurized milk was not what one would really call pasteurized milk. Commercially pasteurized milk was milk that had been subjected to superheated steam at a pressure of 15 pounds, and this was really sterilized milk. When one used properly sterilized milk much better results were obtained than with the commercial product. The best method was to get properly certified milk and to sterilize it at home.

DR. SAMUEL MCC. HAMILL, Philadelphia, said Dr. Hess had not said anything against pasteurized milk; he had said that pasteurized milk was a necessity to-day. He did not think it was necessary to come to the defence of properly pasteurized milk. But there was a tendency toward requiring the pasteurization of all milk and if this was done they could no longer get good raw milk, hence it seemed that they should take some action. The medical profession is largely to blame for the attitude of health officers and dairymen; they were not prepared to give good certified milk. There is also some confusion as to just what good pasteurized milk means, and in any action taken by this Society it should be definitely stated what pasteurized milk means. He believed in the pasteurization of milk because we knew that while pasteurization to-day was frequently unsatisfactory it was done in a better way than formerly. In Philadelphia in most instances it is done efficiently. The dangers of pasteurized milk were not to be compared with those of raw milk. Scurvy is a disease that is easily controlled and cannot be compared with the diseases that are milk borne. Dr. Hamill said he would like to ask Dr. Hess upon how many cases he based his opinion in reference to the part played by pasteurized milk in the production of scurvy and whether any cases of the same type had occurred in babies fed on modified raw milk. Dr. Hess had said that scurvy was on the increase and this fact was borne out by the experience of physicians in Philadelphia.

Dr. Henry L. Coit, Newark, said he would like to ask Dr. Hess what he meant by scorbutic vitamines. It seemed from his experience that since the crusade for pasteurized milk scurvy had been on the increase, but as to the causative relation existing between pasteurized milk and scurvy he was not prepared to make any definite statement. Isolated cases proved nothing and cases in institutions were hardly convincing. Before attaching much value to Dr. Hess's statistics he would like to know something of the heredity, capacity and vitality of the babies upon which these statistics were based. The tendency to require the pasteurizing of all milk was a most disquieting thing to medical men. The term "pasteurization" has been rather overworked and he had found it an advantage to substitute the word "refine." He found that this had quite a hypnotizing effect on the women, which was effective in getting them to carry out directions for the proper modification of milk. The important point was to get initially clean milk; with this one could accomplish much more than with commercially pasteurized milk. Dr. Hess's point that the possibility that pasteurized milk might cause scurvy should be brought to the attention of health boards and those in charge of milk stations should be emphasized.

Dr. Henry Heiman, New York, said that we should have laws to govern the commercial pasteurization of milk. There was no way to tell whether we were getting pasteurized or sterilized milk. The probability was that when the mother got pasteurized milk she gave it another pasteurization. One can give five drops of orange juice to a baby at the age of one month and other fruit juices as well, such as pineapple, which will furnish the missing link.

Dr. Philip Van Ingen, New York, said that in connection with the emphasis that had been placed on the increase of scurvy since the introduction of pasteurized milk they should also mention the decrease in the infant death rate that had taken place as a result of the use of pasteurized milk.

Dr. Maynard Ladd, Boston, said he had seen a half a dozen cases of scurvy in babies presumably taking raw milk, and found that the milk had been overheated at the time it was warmed for feeding, so that these children were practically getting pasteurized milk.

Dr. Hess, in closing the discussion, said that he did not feel that the conclusions could be drawn from his paper that pasteurized milk was not advantageous. The only conclusion that could be drawn was that pasteurized milk was not a complete food and that all that was necessary to make it a complete food was to give orange juice or potato water, but not the commercial potato water. He felt that there was a predisposition to scurvy which must be taken into consideration. Under the same condition some children developed scurvy and some did not, just as in beri beri some got it and some under like conditions did not. As to whether an infant develops scurvy this may depend on the mother and what food she has taken during pregnancy. Dr. Heiman had asked why boiling destroyed the vitamines in milk and not in orange juice. That seemed to depend on the medium in which the boiling took place. They were not destroyed by boiling in water, but were in fats, such as the fats contained in milk. He had had a control series which were fed orange juice and none of them developed scurvy. In the children that developed scurvy the feeding of raw milk produced a sharp reaction and an increase in weight.

As to what a vitamine is, Dr. Funk has isolated them from various food stuffs; they are nitrogenous substances. The term is good as indicating the essential part they play in growth and nutrition.

As to the vitality and general condition of the children upon whom the conclusions are based, these children have been under our care in most instances from birth and the environment is good. These children compared very favorably in every respect with normal healthy children elsewhere.

SARCOMA OF THE KIDNEY TREATED BY X-RAY

DR. ALFRED FRIEDLANDER, Cincinnati, presented this paper. He said that it was generally accepted as axiomatic that the only hope in cases of sarcoma of the kidney in childhood lay in early nephrectomy, but even with this procedure the mortality was very high on account of the likelihood of metastases, even in those cases in which the operation was well borne. The patient was four years of age and was admitted to the Cincinnati General Hospital on October 20, 1915. The history was one of increasing languor and lassitude, with loss of appetite and anemia. Except for the condition of the abdomen the physical findings were not of moment. The entire left abdomen was filled by a tumor extending from the costal margin in the nipple line to 3 cm. above the umbilicus. It was hard, distinctly nodular, apparently not tender to touch, and could be moved forward by pressure from behind. Urinalysis on admission showed distinct miscroscopic hematuria. The blood showed a secondary anemia. Fluoroscopic examination with the colon partly filled with gas showed a sharply-defined dark shadow in the region normally occupied by the kidney. X-ray plates of the lungs for the characteristic metastatic sarcomatous shadows were negative. The X-ray treatments were given because of the apparent hopelessness of the case. After the seventh treatment it was noticed that the tumor had decreased very markedly in size. Later the child had an attack of influenza, then one of measles, which was followed by death. The autopsy revealed a sarcoma of the left kidney, with small metastases in both lungs and in the liver.

The pathologist's report was presented and it was noted that the stained sections showed the most widespread and generally diffuse necrotic changes with no evidence of inflammatory reaction; the stroma showed degenerative changes, associated with irregular areas of edema. The parenchyma was almost completely necrotic and showed almost no evidence of structure. In the areas in which some stroma persisted the appearances were those of alveolar sarcoma, and in these areas short spindle cells and round cells were present, chiefly in the latter. The fact that the whole necrotic process was so widespread in so large a tumor mass; that there was no evidence of vascular thrombosis in the main vessels, and no evidence of infarction; and the fact that the degenerative process appeared to be gradually progressive, indicated that the X-ray treatments were at least partially the cause of retrogression. This was a particularly unfavorable case and it seemed justifiable to say that if nephrectomy was contraindicated in a case of sarcoma of the kidney the X-ray should be given a thorough trial.

TRANSIENT ABDOMINAL TUMOR IN A CHILD OF FIVE YEARS, WITH REDUNDANT COLON

Dr. Edgar P. Copeland, Washington, D. C., read this paper, and said that the complaint in this case was the periodic occurrence of an abdominal tumor, and the brief history was as follows: The patient was the only child of young and healthy parents. The child was delivered by instruments after a tedious labor. The infant was normally nourished for two days after birth, when a promising lactation for some reason failed. After this the child ran the gauntlet of proprietary foods, which was continued well into the second year. He sat up at five months, began the eruption of teeth at eight months and walked at nineteen months. With the exception of frequent attacks of rhinitis the boy escaped all the diseases peculiar to childhood, progressing in a fairly normal manner to the age of three and one-half years. His present illness began in December, 1914, approximately a year before the writer's first examination; he became suddenly ill in the night, with extreme nausea, severe vomiting and the appearance of a rounded tumor in the hypogastrium, simulating a distended bladder. To judge from the description, the vomiting was simply bile and stained gastric juice, at no time stercoraceous. The tumor was elastic, but not specially tender to touch. There was no history of previous disturbance in the regularity of the bowel. There was no fever. The physician called in at this time made a diagnosis of intussusception and had completed plans for an immediate removal of the patient to the hospital for operation. Returning a few hours later, he was much surprised to find that the mass had spontaneously disappeared and the patient recovered. Since this initial appearance, these attacks had occurred at varying intervals, seldom less than three weeks, and on several occasions as long as six weeks. They had varied in the severity of associated symptoms and likewise in duration, seldom lasting over two days. The tumor had invariably appeared first over the region of the bladder, moved about the abdomen spontaneously and finally disappeared. Its appearance had always been associated with nausea and vomiting, and its disappearance with a pronounced paroxysm of abdominal pain.

At the time of the writer's examination he found the patient in bed, lying on his back, thighs partially flexed. The attack was several hours old and there was still some nausea. Presenting in the hypogastrium was a smooth, rounded tumor about the size of an orange, elastic but not tender to the touch, and dull on percussion. It was palpable by rectal examination and suggested strongly a distended bladder. It was possible, without undue force, to manipulate the tumor about the entire abdomen. There was a fairly well pronounced beading of the ribs. The pulse was rapid but regular. The temperature was normal. The leukocyte count was 11,500. The von Pirquet and Wassermann tests were negative. Under restricted feeding and large enemata, slowly administered, the mass spontaneously disappeared. An examination of the abdomen subsequently was absolutely negative.

The clinical history, in the light of the X-ray findings, would seem to justify the assumption that the phantom tumor is the result of a temporary kinking of the redundant colon (or sigmoid), incident to its displacement to the right, which was followed by either fecal or gaseous distention in the loop. When the loop fills itself to a certain point, it swings gradually to the left and automatically unkinks itself with a disappearance of the tumor mass.

REPORT OF A CASE OF INFLUENZA IN AN INFANT WITH TWO UNUSUAL COMPLICATIONS—PURPURA AND SUBCUTANEOUS EMPHYSEMA

Dr. Henry T. Machell, Toronto, Canada, read this paper and said that this baby when seen in consultation was six and one-half months old and had always been well and healthy, weighing 15 pounds until the present illness. The child was taken ill with the grippe on March 28th and was seen by Dr. More on April 6th, at which time there was present a well-developed lobar pneumonia of the right base. The child's temperature was 104°F., pulse 140 and respirations 60. In addition, there was a purpuric rash over parts of the body, the face, particularly the chin, the shoulders, arms, chest, legs and feet. The petechiæ varied in size from a mere dot to one patch on the left shoulder the size of a ten-cent piece. Another patch on the left cheek was slightly smaller. These large spots had a punched-out feeling to the palpating finger, as though they had previously contained fluid. The skin was unbroken and there had been no discharge. The mother stated that this rash had been present from the first appearance of the illness. There was a cough, which was neither frequent nor violent. On April 13th the attending physician noted a slight swelling at the sides of the neck, under the chin and down over the upper part of the chest. The swelling continued to increase until two days later, when the writer was called to see the child again. At this time the child's condition with reference to temperature, pulse and respiration had improved and the lung had about cleared up. The petechial spots had increased in number, especially about the chin, shoulders and forearm. The swelling around the neck, cheeks and chest had increased to such an extent that the chin was crowded upward and the head forced backward. It was tense, tympanitic and crackling under the fingers. This swelling was symmetrical in size and obviously emphysematous. Dr. Machell said this was the first time he had seen purpura or emphysema as a complication or sequel to influenza. The emphysema gradually improved, and within five days from the time he had seen the patient it had almost disappeared. On April 19th the child had an extra severe coughing spell, when the emphysema suddenly became more marked, his breathing became embarrassed, and he died within twenty-four hours. An autopsy was not allowed. Purpura as a complication of influenza, so far as he could find in the records of the Academy of Medicine of Toronto, was not mentioned. In the Lancet, January, 1890, under the title "Occurrence of Rash in Influenza," H. P. Hawkins was able to quote 7 cases with a rash in 1,000 cases of influenza at St. Thomas's Hospital in London. From the description of these cases some were undoubtedly medicinal, so that it must be concluded that purpura as a complication of influenza is infrequent. Emphysema was mentioned in a few text-books as occurring occasionally in pertussis, bronchitis, etc., but the writer had not seen it mentioned in connection with influenza.

Afternoon Session, May 8, 1916

A BRIEF REPORT OF 60 BLOOD EXAMINATIONS IN INFANCY, WITH A REVIEW OF THE RECENT LITERATURE OF THE BLOOD IN INFANTS

Dr. H. M. McClanahan and Dr. A. A. Johnson, Omaha, Neb., stated that this investigation was made in an institution which takes infants for adoption and is primarily a home and not a hospital. They had studied the current literature in the English language for the period of 1910 to 1915 inclusive and had abstracted the articles on this subject. After going over this literature they have decided to limit their work to the relative percentages of the white cells, since there were only two articles dealing with this phase of the subject. The first of these is by Schloss (Archives of Internal Medicine, 1910, Vol. VI., p. 658). He calls attention to the variations in the percentage of the different varieties of leukocytes in apparently normal infants. This is in line with our experience. His percentage of eosinophiles averaged higher than in our series. Second, Mitchell (American Journal Diseases of Children, 1915, Vol. IX., p. 358) studied the leukocyte count during digestion in bottle-fed infants. He studied 50 infants, making a count every half hour after every feeding until the next feeding. His conclusions were that leukocytosis occurred constantly in only 12 per cent. of the cases. In 32 per cent. of the cases they occurred occasionally, and in 56 per cent. leukopenia occurred constantly. In the present series the blood was taken from the infants without regard to the time of feeding. The counts were made in a total of 81 infants, ranging in age from three weeks to one year. The counts were made by Dr. Johnson and Dr. More, and as their work was done independently it was necessary to eliminate 10 infants upon whom the count was made twice. There was considerable difference in the counts of small and large lymphocytes between the two observers. In the tabulation the large and small were grouped into one class. The following table shows the results:

Age	Cases	Lymphocytes	Polymorphonuclears	Transitionals	Eosinophiles
Under 2 months ...	20	64	28	5	1
2 to 4 " ...	17	69	25	5	1
4 " 6 " ...	3	60	35	5	0
6 " 8 " ...	5	55	40	4	0
8 " 10 " ...	6	52	44	5	2
10 " 12 " ...	17	64	31	5	0

Schloss quoted the following percentages of eosinophiles averaged from infants one to six months old and from six to twelve months old infants that were acutely ill. The latter had hemoglobin over 50 per cent. and suffered from no condition recognizable as a cause of the eosinophilia. For infants from one to six months old the percentage of eosinophiles varied from a maximum of 9.35 to a minimum of 0.35, giving an average of 3:59. These findings indicated a remarkable oscillation. Rosenstern found eosinophiles above 3 per cent. in none of six normal breast-fed infants, but in artificially-fed infants the percentage varied from 0.7 to 4 per cent. The highest percentages were in infants from two days to two weeks of age. He stated that there was a remarkable variation in percentages of the different varieties of leukocytes in apparently normal infants and that there was a uniform increase of polymorphonuclears and a decrease of lymphocytes with advancing age. In apparently normal infants the percentages were frequently above the normal for adults, but rarely above 5 per cent. and never above 6.

Dr. Oscar M. Schloss, New York, said that up to the present time few blood counts had been made on normal children. It was desirable to have the normal count as a basis for the interpretation of the count in pathologic conditions. He had made some counts which showed the same thing that Dr. McClanahan had called attention to, namely, that it was a matter of great difficulty to establish a normal average for the white cells, since they showed a very great variability. It was also very difficult to classify the large and small lymphocytes. In these counts it would be more accurate to state the maximum and the minimum than to attempt to state an average.

Dr. David M. Cowie, Ann Arbor, said he had made some blood examinations in children; he had made the examinations from day to day, but not from hour to hour and had found practically the same things that Dr. McClanahan and Dr. Schloss had found.

THE CREATININ AND CREATIN CONTENT OF THE BLOOD IN CHILDREN

Drs. Borden Veeder and Meredith, St. Louis, said there was comparatively little data on the creatinin and creatin content of the blood, though there have been some studies of the creatinin-creatin content of the blood in nephritis. The figures obtained by Folin and Denis, Myers and Fine, and Meyers and Lough differed widely. Because of the difference in the creatin-creatinin metabolism in adults and children, as measured by their content in the urine, they decided to test the blood of a number of children with different clinical conditions and compare the results with the total non-protein nitrogen of the blood. Folin and Denis found that the content of non-protein nitrogen in the blood of a healthy adult was from 22 to 26 mg. per 100 c.c. Later they published determinations made in a large number of clinical conditions, which showed that there was a definite increase or retention of the non-protein nitrogen in nephritics with uremia and that greater variations were found in the blood of hospital patients. Slightly higher values were not necessarily associated with renal disturbance. These findings had been confirmed by a number of observers. There was an increase of from 4 to 6 mg. after a full meal, and usually a slight increase in acute infections. In nephritics the content might vary from normal to ten times normal, the high values being found in actual or impending uremia. In children the non-protein content did not vary in any marked degree from the adult. Tileston and Comfort made determinations on 51 children with a variety of clinical conditions. Normal children gave values of from 20 to 34 mg. per 100 c.c. Only 1 case, a child with acute nephritis, showed a definitely increased value; 63 mg. per 100 c.c. In this case the content became normal with the disappearance of the uremic symptoms. The rest of the observations were on children with acute and chronic infections in whom normal values were found.

In normal infants the non-protein nitrogen content has been found by Schlutz and Pettibone to vary between 23 and 44 mg. per 100 c.c.; these observations were made on 9 infants from one-half hour to ten days old. The methods used in the present study were those of Folin and Denis for the non-protein nitrogen and of Folin for the creatin and creatinin. Determinations were made on 70 children. Many of these, particularly those with scarlet fever, were tested a number of times. The blood was taken early in the morning before the children had had their breakfast, and thus some twelve hours after the children had had their last meal. The cases are grouped into normal scarlet fever at the time of the exanthem when there was an elevation of temperature, afebrile scarlet fever in the first week, and a number of examinations made in the third week of convalescence when the urinary findings were negative. In addition, a number of miscellaneous conditions were also investigated. The creatinin figure for normal children varied between .58 and 3.44 mg. per 100 c.c. In 10 children the figure was under 2 mg. and in 2 children it was above. The febrile scarlet fever cases varied between 1.08 and 3.82 mg., but with one-half above 2 mg. and none under 1. The highest figure in the early febrile case was 2.78, but in one-half the cases the content was a little over 2 mg. Like variations were encountered in the miscellaneous conditions. There was no specific retention in any of the cases, although as a whole the figure for the creatinin content of the blood in children was somewhat higher than for the adult. A comparison of the creatinin content with the non-protein nitrogen had been made, and the results tabulated. As a general rule, both the non-protein nitrogen and creatinin were within the same general limits, as had been found for normal adults, and as Tileston had found for the non-protein nitrogen in children, although the average figures for both were a little higher in children. They had studied 6 cases of nephritis and found that non-protein nitrogen was not increased in 2 cases and the creatinin was normal in 3. In 1 case with a low non-protein figure the creatinin was high and in 2 an opposite condition held. As the nephritis in a given case improved the amount of retention decreased. Fourteen cases of scarlet fever were followed from the stage of acute exanthem until desquamation was completed and tests were made weekly for five weeks. None of these cases developed a typical scarlatinal nephritis in the third or fourth week. After the acute febrile period was over there was usually a slight fall in the non-protein nitrogen and creatinin, although in the second week a few showed a slight increase. One severe toxic case that died in the third week showed an increasing retention. The kidney in this case showed acute fatty degeneration. There was no apparent relationship between the amount of creatin and creatinin. They found much less creatin in the blood of children than Folin reported having found in the blood of adults. This was interesting in view of the fact that creatin was found in the normal urine of children and was not present in the urine of adults. Determinations made on a child starved for other purposes showed a slight increase in the content of all three substances during the period of starvation. In a few experiments made with reference to the effect of diet and copious water drinking the results seemed to show that these factors were negligible in these cases. What mechanism controlled the relation between the amount of creatin in the blood and the quantity in the urine they were unable to ascertain.

THE HOSPITAL CARE OF PREMATURE INFANTS

DR. L. E. LA FÉTRA, New York, said that this paper was a resumé of his personal experience in the observation and treatment of these cases. During the past two years there had been admitted to the infants' wards of Bellevue Hospital 278 premature infants. Of these, 13 were still in the wards and 265 had been discharged. There is perhaps no other institution, either here or abroad, that has so many cases. The mortality among these infants is very high, but most of it occurred during the first few days after admission to the hospital. A great deal could be done even for the smallest and feeblest of these infants. The records of the last 200 cases showed that 30 were saved, and discharged as cured, and were strong enough so that their mothers could care for them successfully. Of the 170 that died in this last 200 cases, 90 died on the first day. many within an hour or so of admission; 28 more died on the second and third days, making 118 that died within the first three days. The smallest infant that was discharged cured had an admission weight of 2 pounds, 13½ ounces. The baby remained in the hospital seven months and weighed 5 pounds, 6½ ounces at the time of discharge. Three years ago, while visiting the children's clinics on the Continent, Dr. La Fétra said he learned that the smallest premature infant they had successfully reared in Paris weighed 800 grams. It was most unusual that a baby weighing less than 2½ pounds was saved. The greatest majority of infants admitted to the premature wards had a history of utero-gestation between seven and seven and one-half months. In this respect it must be remembered that the history must not be depended upon. Taking the averages of infants at six, seven and eight months' utero-gestation, it would be found that there were many exceptions.

After discussing the causes of prematurity, the essayist said that, aside from the small size and weight of these infants, they showed extreme muscular feebleness, which extended even to the muscles involved in sucking and swallowing. In many instances this was the underlying cause of the fatal inanition. Another symptom manifested by nearly all these babies was a temperature far below normal. The skin was imperfectly developed and the subcutaneous fat deficient or lacking, so that the infant radiated more heat proportionately than the infant of normal size. Again, the heat regulating center seemed not to be in satisfactory operation, so that the baby was very susceptible to the heat changes of its environment. These babies also showed a tendency to attacks of cyanosis and were extremely susceptible to all sorts of infection. Absorption from the gastrointestinal tract of deleterious substances, whether as the result of fermentative processes in the intestines or of germ infection, might cause profound and even fatal disturbance in a very short time. General sepsis might arise from this source or from the umbilical wound or from an abrasion of the skin. In the general management of these children the object was, so far as possible, to reproduce the conditions of intrauterine life. The baby should be kept in an even temperature approximating that of the human body and should be shielded from all sorts of external shocks, either thermal or mechanical. The skin should be protected from all chance of contagion and injury and the eyes should be protected from light. The inhaled air should be moist, comparatively warm, and as free as possible from germs. The food should be such as to require the least possible amount of digestive effort on the part of the baby. As to the use of the incubator, his experience with most incubators and their methods led him to advise against their use. The plan of setting apart a small room as an incubator room was much more satisfactory in every way. Here the baby did not have to undergo any chilling when the clothing was changed. The most complete incubator rooms had the air drawn in from outdoors, in cities preferably from the roof, then warmed, filtered and moistened. The temperature of the room was regulated automatically. Such an installation was quite expensive. Probably the most satisfactory incubator was that devised by Dr. Edwin B. Cragin and described in the Journal of the American Medical Association for September 4, 1914. At Bellevue, on account of the prospect of a new Children's Ward, a very simple and inexpensive premature ward has been devised. The sunny corner of a ward facing south was partitioned off and double windows and transoms installed. The number of radiators was increased. Ventilation was secured by means of the transoms and the door leading into the rest of the ward. This ward has a capacity of 10 beds and a cubic air space of 1,000 feet per crib. Moisture is obtained by keeping a large pan of water simmering on an electric stove. After much experimenting they found that the babies did best when kept in a temperature of 76°F. to 80°F., with a humidity of 60 to 70 per cent. Incidentally they found the warm room of great advantage in managing feeble infants that were not premature. The premature baby should be handled only when necessary to change the gauze diaper. The clothing should be the simplest possible. Babies weighing less than 4 pounds should be wrapped in cotton and kept so swathed until the temperature remained constantly at normal and the weight had risen to 4 or 4½ pounds. After the initial sponge bath and oiling no bath should be given for four or five days; then a sponge bath may be given every other day for a few days, and then every day. In order to feed these babies we must often put the food into their mouths and even into their stomachs. In general, the most satisfactory method of feeding these babies is to use the Breck feeder. After the warm food is placed in the tube the nipple is put in the baby's mouth. This has the advantage of teaching the baby to draw upon the nipple, but without exhausting its strength. Feeding by the medicine dropper was not so satisfactory, because it did not teach the baby to suck. In some cases the baby cannot swallow satisfactorily and then it is necessary to resort to gavage. It was found that the baby was less likely to vomit if the tube was passed through the nose. The food most suitable and that requiring the least digestive effort is breast milk. At Bellevue three wet-nurses are kept constantly to supply breast milk for the premature babies. In all private cases an effort should be made to secure good breast milk, either from some maternity hospital or, better, from a wet-nurse kept in the house with her infant, the latter to keep the breast milk from drying up. The milk is to be expressed from the breast two or three times a day and a requisite amount mixed with either whey or barley water or Granum as a diluent and then fed to the baby from a Breck feeder. At Bellevue they used one-half breast milk and one-half whey at first, 1 ounce being given every one and one-half to two and one-half hours, depending upon the size of the baby and its stomach capacity. If it is impossible to obtain breast milk a cow's milk modification is employed, using 6 per cent. top milk as the basis and diluting with whey or gruel made from Imperial Granum. Five ounces of 6 per cent. milk, 10 ounces of whey and 5 ounces of Imperial Granum are used to make a 20-ounce mixture. To this is added milk sugar or dextro-maltose, ½ to 1½ ounces. The number of calories per kilogram required by the premature baby is much higher than for babies at full term. It is necessary to increase the calories to 1¼ to 1½ times the ordinary requirements. An important apparatus in the premature room is the oxygen tank all coupled up and ready for instant use in case of cyanotic attacks. As to the prognosis, the weight is the best criterion we have, but we must not despair of even the smallest babies. If a baby has survived for a week it has a better chance to live, no matter what the weight, since the fact of having survived that long augurs a good constitution.

DR. BORDEN VEEDER, St. Louis, described a premature ward that they had in the St. Louis Hospital in which the heat was furnished from an adjoining closet and the ventilation by means of a transom. They kept the temperature at from 80° to 88° F. and the babies wore scarcely any clothing. A great many of the babies got more than 125 calories daily; some got as much as 185 calories. They had also observed that sometimes after a baby had gained for a time it did not gain so rapidly and that then if it was dressed as an ordinary baby was dressed and put out into the ward the weight would begin to go up again.

DR. JULIUS P. SEDGEWICK, Minneapolis, said that Dr. La Fétra had spoken of a short interval between feedings, one and one-half to two hours, but others had been able to employ a four-hour interval. There was probably a difference in the technic of the feeding that accounted for the success with the four-hour interval. The four-hour interval could be used and had some points in its favor.

DR. L. E. LA FÉTRA, New York, said he had not been successful with the long interval between feedings and would be glad to have Dr. Sedgewick give them some of the points in the technic by means of which they had been successful with the four-hour interval. When he had used the four-hour interval the child did not get sufficient food in twenty-four hours, and it seemed evident that there was something in the technic that they did not know.

Dr. Sedgewick said there was one point with reference to getting enough food into these children and that was that they could be given more food than the stomach content would indicate. They did not use as much as 180 calories, but usually from 120 to 150, and they had no trouble in administering this amount. If the child could not take it in the ordinary way it was given by tube. They always used breast milk and the amount given depended upon the size of the baby. They usually went slowly at first, starting by giving feedings of from 10 to 15 c.c. five times daily, making about 75 c.c. a day. This amount was increased as rapidly as the baby could bear it. They had no rule of giving so much at such and such a time, but were guided entirely by the needs of each individual child.

Dr. B. Raymond Hoobler, Detroit, said it was possible to devise an incubator that could be installed in a home. This might be done with a clothes basket and barrel hoops, arranged to make a tent and covered with blankets. The heat could be furnished by ground-glass electric light bulbs and the child's eyes protected from the light by a black cloth curtain. With such an arrangement the temperature in the tent could be kept very constantly between 85° and 90° F.

FURTHER EXPERIENCES WITH HOMOGENIZED OLIVE OIL MIXTURES

Dr. Maynard Ladd, Boston, stated that in February, 1915, before the New England Pediatric Society, and in May, 1915, before the American Pediatric Society, he called attention to the possible uses of the homogenizing machine of M. Gaulin, of Paris, for purposes of modifying milk for difficult cases of feeding, especially those showing intolerance for fat. Homogenization of liquids of different densities consists in reducing the constituent elements to such a physical condition that they will no longer separate, but will maintain a permanent and even composition throughout the mixture. It was possible by this process to improve the emulsion of a modification of cow's milk so that it would be even finer than that of breast milk without altering in any way the chemical properties of the milk. There was reason to believe that such a milk might be better digested and assimilated. More interesting was the possibility of substituting some other fat than cow's milk fat in cases of malnutrition, in which it was often difficult to give fat enough to make a child gain normally in weight without precipitating sooner or later a digestive crisis. The principal difference between the fat of cow's milk and that of breast milk was in the size of the fat globules and the proportion of volatile fatty acids. The non-volatile fats were made up mostly of olein and palmatin in both cow's milk and breast milk. Olive oil was almost wholly olein and palmatin and free from volatile fatty acids. It was Dr. Ladd's suggestion, therefore, to use olive oil to obtain the fat percentages in modified milk mixtures and so to eliminate the volatile fatty acids; and also by homogenization to secure an emulsion as fine or finer than human milk. The milk sugar and proteins were to be obtained from skimmed milk as usual, and additional carbohydrates in the form of dextrin-maltose and starch prescribed according to the usual indications.

This method of feeding had been applied to 37 cases, the present series including the subsequent histories of the cases reported last year. A normal healthy baby gained, according to a high standard of growth, an average of 18.7 ounces per month. In this series of 37 cases whose average gain on previous feedings was 5 ounces per month for a period of 6.3 months, the average gain per month was 18.15 ounces on the homogenized olive-oil feeding. The average period of feeding was 4.7 months, a sufficient time to determine its permanent effects. The improvement in the babies' general condition had been as striking as the gain in weight. Vomiting and sour regurgitation, when present as symptoms, quickly subsided. The child improved in strength, in the quality of its fat, and in development of its functions, as one would expect it to do in normal, successful feeding. In some cases the mixture was heated to 212°F., in others given unheated. Lime water was usually given in amounts of 5 to 10 per cent. of the total mixture, but not as a matter of routine. The percentage of olive oil was almost invariably started at 1.50 per cent. and did not exceed 3.50 per cent. The total carbohydrate was usually started at about 5 per cent, and never exceeded 7 per cent. The proteins were started at 1.50 per cent. and seldom exceeded 2 per cent. Hunger is the safest guide to the child's tolerance to the amount of fat it is taking. This method of dealing with fat intolerance and other cases of difficult feeding is applicable in cities supplied by milk laboratories and in hospitals which will incur the expense of installing a homogenizing machine.

Owing to the courtesy of Dr. Bowditch, Dr. Wyman made use of suggestion that olive oil homogenized milk mixtures be used in the early days of convalescence from diarrheas due to indigestion and fermentation in the Floating Hospital last summer. The general scheme of treatment was as follows: After the initial period of catharsis and starvation, a fat-free lactic acid milk, diluted two-thirds or one-half, was given. If the infecting organism proved to be the Flexner or Shiga type, dextri-maltose was added up to 4 or 5 per cent., and sometimes barley water. If the gas bacillus was present no carbohydrates were added. After a period of several days, when the acute febrile disturbance showed signs of subsidence, olive oil was homogenized with the lactic acid milk, in percentages of 1.00, 1.50 and, if well tolerated, 2.00; this added considerably to the caloric value of the food and prevented or lessened the loss of weight which occurred in such cases. There were 19 cases of infectious diarrhea, 15 of the Flexner bacillus type, 1 of the gas bacillus type and 3 undetermined. Four cases died, giving a mortality of 22 per cent., about the same as in the other services. Of the 15 cases that lived, 8 were in the hospital for an average of twenty-one days and each lost over their entrance weight about 15 ounces. Seven were in the hospital on an average of fourteen days each and gained an average of 10.7 ounces over their entrance weight. The average net loss of all the 15 surviving cases was therefore only 3 ounces over the entrance weight. It seemed from this series of cases that olive oil homogenized could be given safely after the acute febrile stage had passed and in the period of convalescence and was more effective in making up the loss of weight than the fat of cow's milk.

A study of the fat metabolism of infants fed on homogenized milk was carried out at the Boston Floating Hospital by Dr. C. H. Laws, of the University of Michigan. There were 4 cases. The result of the experiments in these might be objected to because of the artificial conditions imposed by the experiments, but the results of the clinical cases extending over a period of nearly five months on an average were of decided significance, justifying the belief that homogenization of milk mixtures and the substitution of olive oil for cow's milk fat offered an additional and valuable resource in infant feeding in cases of difficult digestion with malnutrition.

A METHOD OF PREPARING SYNTHETIC MILK FOR STUDIES OF INFANT METABOLISM

Dr. Henry I. Bowditch and Dr. Alfred W. Bosworth, Boston, found, in connection with their investigations concerning infant feeding, that it became necessary to control all factors entering into the composition of the food used, and as only liquid food could be used it soon became evident that a synthetic food from pure materials offered the only solution of the problem. After many experiments during the past few years they have finally perfected the method herein to be described, and have used milk prepared according to this formula for several investigations with success. The method consists of the following four steps: (1) The preparation of isolated food material for use in making synthetic milk. (2) The recombining of these materials to give a mixture of the desired composition. (3) The emulsification or homogenization of the fat and any of the solid or insoluble constituents entering into the composition of the food. (4) Pasteurization or sterilization of the food after it has been made. The following substances may be used as the case demands: Distilled water, pure fat, pure sugar, pure protein, pure salts of various kinds, and the protein-free milk of Osborne and Mendel. Thus far they had used only olive oil and butter fat. The olive oil used was the purest commercial oil they could obtain, but the butter fat had been a pure product prepared according to the method of Osborne and Mendel. In some cases they had used the sugars of the purest commercial grade, while in others they had used recrystallized lactose. So far they had used only one protein, casein, and had made use of this substance in three forms—calcium caseinate of commerce, the sodium caseinate of commerce, and pure casein prepared according to the method already published by them. The salts should all be of the highest purity and the ones most likely to be used are the phosphates, chlorates, acetates, and citrates of calcium, magnesium, sodium and potassium. Osborne and Mendel had shown that a synthetic food made of pure materials contains no vitamines which seem to be essential to promote the growth of an animal receiving such food. These substances were present in a preparation made by them and called protein-free milk. In investigations involving the continued use of a synthetic milk for more than a few days it was always wise to add some of this protein-free milk in order to get the benefit of the vitamines carried in it. All their synthetic milks had been made up on the percentage basis. The sugar was dissolved in one-half the volume of distilled water required for the complete mixture and the salts added to this sugar solution. The protein was dissolved or suspended in the other half of the water. If Larosan or nutrose were to be used they should be rubbed to a fine paste with a small portion of the water, the remainder of the water carefully added and then the whole gently warmed in warm water to effect complete solution. If pure casein or paracasein were used they might be suspended in the water and homogenized with the fat or they might be dissolved by the addition of an alkali, one-half of a cubic centimeter of normal alkali or its equivalent being used for each gram of protein. If strict percentages are to be observed the volume of water used must be diminished by an amount equal to the volume of alkali solution used to dissolve the protein. The two and one-half volumes are now united, the fat melted and added and the whole homogenized. The successful use of these synthetic milks depends to a very great extent upon one's ability to produce a homogenous mixture of considerable permanency and this result has been obtained by the use of the Manton-Gaulin homogenizing machine. This is a small one of special design built for laboratory use. Before use the machine is thoroughly cleansed and a solution of hydrogen peroxide run through the apparatus for fifteen minutes and the last traces of this removed by the use of hot, recently-boiled, distilled water. Mixtures containing liquid fats might be homogenized at once without warming, though more satisfactory results will be obtained by slightly warming them. Mixtures containing semi-solid fats must be heated to a temperature of a few degrees above the melting point of the fat used. All the fat was allowed to enter the machine first with a small portion of the liquid. The fat and this liquid were allowed to run through the homogenizing chamber once or twice at a pressure of 50 kilograms per square centimeter. The pressure was then increased to 150 kilograms and the whole mixture run through the machine, after which the pressure was increased to 200 to 250 kilograms and the mixture run through once or twice more. In appearance the mixture now strongly resembled milk. The synthetized milk was then transferred to glass fruit jars, sterilized jars with glass tops being the best. The water, reaching to about two-thirds the height of the jars, was allowed to boil gently for about thirty minutes. If the food is to be kept for any number of days it should be heated again and then stored in a cold place.

A STUDY OF THE TOPOGRAPHY OF THE PULMONARY LOBES AND FISSURES, WITH SPECIAL REFERENCE TO THORACENTESIS

DR. J. C. GITTINGS, DR. GEORGE FETTEROLF and DR. A. GRAEME MITCHELL, Philadelphia, said that the fissures of the lung in infancy showed practically the same relation to the bony framework of the chest as in adults. The origin, course and termination of the fissures varied greatly in different individuals. The variations apparently did not depend upon any of the anatomic characteristics of the chest and could not be predicted therefore. The lower level of the lungs in infants did not extend quite as low as in adults. For this reason, and owing to the anatomic characteristics of the bases of the pleural cavities, in early life, great care should be exercised to avoid damage to the diaphragm in performing thoracentesis. It would seem that the lowest point for tapping with absolute safety, therefore, would be the fifth or possibly the sixth interspace in the mid-axillary line, and the seventh and possibly the eighth interspace in the line of the angle of the scapula. In the author's clinical experience it might be said that the seventh or eighth interspace in the post axillary line, which lies nearer to the scapula than to the midline, was the optimum point of attack.

Second Day, May 9, 1916

REPORT OF COMMITTEE ON VAGINITIS

This committee, consisting of Dr. J. C. Gittings, Dr. Samuel McC. Hamill, Dr. C. A. Fife and Dr. Howard C. Carpenter, of Philadelphia, presented their report through Dr. Gittings. He stated that they had been appointed to investigate the subject of vaginitis in infants and young girls and had conducted a very thorough investigation. A questionaire had been sent to various institutions caring for female children and to a large number of pediatricians. The replies to this questionaire Dr. Gittings analyzed. With these replies as a basis they had formulated the following set of resolutions for the consideration of the Society:

1. That the American Pediatric Society address a letter to Health Officers of State and Cities containing the following recommendations:

A. That cities be required to provide adequate hospital and dispensary facilities for the care and treatment of children having vaginitis.

B. That matrons be placed in charge of the girls' toilet rooms in public schools.

C. That toilet seats embodying the principle of the U-shape be used in all schools and that the toilets be of proper height for different ages.

D. That city and state laboratories be empowered and equipped to make bacteriologic examinations for physicians when patients cannot afford to pay a private laboratory fee.

E. That educational literature on the subject of vaginitis be prepared and distributed to mothers through the medium of physicians, hospitals, dispensaries, health centers, municipal and visiting nurses.

F. That asylums for children and day nurseries be licensed, and that the license be not granted unless, first, the institution has adequate facilities for the recognition of gonococcus vaginitis, and, second, that the institution exclude children having this disease if they cannot be properly isolated.

2. That the American Pediatric Society address a special letter to hospitals which care for children containing the following recommendations:

A. That separate wards be maintained for the treatment of children with vaginitis who are also suffering from other diseases.

B. That microscopic examinations of smears be made before admission to the general wards of the hospital. In securing material for the smears extreme care should be taken to observe rigid aseptic precautions.

C. That observation wards be provided.

D. That individual syringes, bed-pans, catheters, clinical thermometers, thermometer lubricant, wash basins, soap, powder, wash cloths and towels be provided.

E. That single service diapers be used (at least for girls); or that diapers be sterilized in an autoclave at 15 pounds pressure for five minutes.

F. That nurses be required to make daily inspection of the vulva of each at the time of bathing, and to report immediately the presence of the slightest suggestion of a vaginal discharge.

G. That low toilets be provided and equipped with seats embodying the principle of the U-shape.

H. That for routine purposes, the spray be used in place of tub baths for the bathing of young girls, and that older girls be sponged in bed.

I. That nurses receive special instruction as to the nature of vaginitis, the ease with which it is transmitted, the methods of preventing its spread and the necessity for rigid aseptic surgical technic in its handling and treatment.

J. That a dispensary with special facilities for the treatment of gonococcus vaginitis be provided.

K. That nursing care and supervision be given in the home.

L. That mothers be instructed as to the dangers of vaginitis, the manner in which it is transmitted, the best method of protecting other children, and the necessity of prolonged observation.

M. That all cases of vaginitis under observation be voluntarily reported to the local health officer in states or cities where no legal requirements are in force.

CERTAIN PHASES OF THE VULVOVAGINITIS PROBLEM

Dr. B. K. Rachford, Cincinnati, said he had considerable experience in the treatment of vulvovaginitis and that in the hospital with which he was connected they had had a ward divided into four compartments for the treatment of this form of infection. The patients were admitted to the first compartment and passed through the other three compartments as they progressed. When they were discharged from the fourth compartment they were turned over into the hands of the children's clinic, where they were kept under continuous observation. Dr. Rachford believed that there were many things that would have to be taken into consideration before vulvovaginitis could be made a reportable disease. The first thing that would have to be done was to make an effort to change the attitude of the public. At the present time the very mention of vulvovaginitis struck terror to people; it carried with it a stigma of disgrace. This attitude should be changed and the public made to understand that vulvovaginitis in children was a different disease from a gonococcus vaginitis in the adult. He thought nothing in the way of reporting these cases could be accomplished so long as the term "gonorrheal" was used.

PROVOCATIVE AND PROPHYLACTIC VACCINATION IN THE VAGINITIS OF INFANTS

DR. ALFRED F. HESS, New York, said they had had to contend with the problem of vaginitis in the institution with which he was connected and had profited in some directions by their experience. This experience might be of service to others who are actively interested in this problem. Their efforts had been directed in various directions; in preventing the admission of infected infants; in attempting in many different ways to avoid spread of infection; in diagnosing the cases at the earliest possible moment, and, finally, in resorting to every means to effect a cure. Vaginitis presented an entirely different problem in a home or asylum from what it did in a hospital for infants. In the latter the solution was comparatively easy and simple, for all that was necessary in order to eradicate the disease was to cease admitting female infants and to discharge the infected cases, one by one, as they were cured of the ailment for which they were admitted to the hospital. In an asylum, on the other hand, when a case of vaginitis slipped by the admitting physician or arose apparently *de novo* in one of its wards, it was realized that a heavy burden had fallen upon the medical staff, for it was probable that this infant would remain for years a threatening source of infection and would have to be guarded under quarantine. The diagnosis of gonococcus vaginitis was not always easy to establish. There was no doubt that vaginitis might be due to organisms other than the gonococcus. There was a class of border-line cases which was exceedingly puzzling, showing merely pus cells on microscopic examination. If these cells were numerous an inflammation was undoubtedly present, and in the great majority of cases the infecting organism would be the gonococcus. The specific nature of this infection was all the more probable if there were no organisms to be seen in the field among the cells. One exception should be borne in mind as regards the diagnostic significance of pus cells. This was called to their attention by noting these cells in an infant only forty-eight hours old who was brought to the institution for admission. It hardly seemed that this was a case of gonococcus vaginitis, so they investigated to ascertain how often pus cells were encountered in smears taken from infants during the first two days of life. These tests were carried out by Dr. Edwin Langrock and showed that in half the cases pus cells might be found in smears taken within the first forty-eight hours, that they must not be regarded as pathologic, but as the probable reaction of the external tissues to the inevitable invasion of bacteria. As they probed deeper they found that the fundamental cause of vaginitis must be considered to be the latent carrier, some healthy infant who harbored the gonococcus. Such had been their experience. Whenever a case of vaginitis arose in the institution the rule was that examination should be carried out three times during the following week in every infant in the ward in order to ferret out the source of the infection. Almost every instance of this kind brought to light some case where, in spite of the absence of discharge, gonococci were evident in the smears. Such recrudescence of infection came about every few months and sometimes oftener. During the past five years autopsies had been performed in 4 infants who had vaginitis while in the institution. They all showed the same pathologic condition: Macroscopically, the vagina appeared negative, as did the body of the uterus and the appendages. The only abnormal condition was redness of the tip of the cervix, which did not extend along the canal to the internal os. Microscopic examination confirmed the gross appearance of these structures. In every instance the entire vagina, the uterus and tubes were carefully examined and the sole lesion was this inflammation of the cervix. From these postmortem examinations it would seem that we must regard the average gonococcus infection as involving the cervix rather than the vagina, and as a cervitis rather than a vaginitis. The degree of vaginitis found in children who applied for admission to the institution was almost 50 per cent., and gave grounds for believing that vaginitis was not a disease particularly associated with child-caring institutions. In order to overcome the danger of the latent carrier they had for the past year administered three injections of gonococcus vaccine soon after a child was admitted to the institution. These infants had all shown the absence of pus cells upon admission. The vaccine was made from a culture obtained from one of the cases in the institution and 250,500, and 750,000,000 were given with three-day intervals. The object of these vaccinations was to see whether they would prove provocative and would bring to light a latent infection. The dosage which was used was entirely empirical. As a result it would seem that it could probably be much smaller. At the present time they were giving 100,000,000, 200,000,000 and 400,000,000. Moreover, two injections might be sufficient and they rarely had brought about a discharge by a third inoculation. During the past year these provocative inoculations had led to the discovery of 8 new cases during the first week or two following their admission to the institution. As a result of this procedure not one new case had slipped into the main institution from the admitting pavilion. They had also made use of this diagnostic aid in the wards where from time to time cases of vaginitis arose, but were unable to state the exact scientific basis of the reaction following these inoculations. It was, however, not due to the rise in temperature, and cannot be regarded as absolutely specific, for a reaction was obtained at times by similar injections of staphylococcus vaccine, although this was not found to be as reliable for this purpose as that made from the gonococcus. The vaccine was found to be of value not only as a diagnostic measure, but to a certain extent for prophylaxis. To this end it was used in about 100 infants and they were able to change the entire nature of the vaginitis in their institution. In cases that were vaccinated the vaginitis showed a mild type of infection. It was not to be expected that prophylactic vaccinations could prevent the occurrence of carriers. However, the protected cases, instead of developing a vaginal discharge full of pus cells and gonococci, were found to have no discharge whatever, and showed as the only evidence of infection a few pus cells and microörganisms in the cervical smears. In other words, a non-clinical type of the disease resulted. There were some diseases which occasioned not only recrudescence of vaginitis, but seemed to confer an added susceptibility. This seemed especially true of scarlet fever. In this disease the susceptibility extended still further, so that joint infection and other evidences of a bacteremia resulted. There was not only an acquired susceptibility to gonococcus infection, but also a natural susceptibility and a well-defined natural immunity. This immunity was rare and in many instances not absolute.

Dr. Fritz B. Talbot, Boston, asked whether after they had made these injections there was a discharge produced by the provocative inoculation and how long such a discharge existed, and also whether it was accompanied by any unusual symptoms.

Dr. J. P. Sedgewick, Minneapolis, related an instance in which a child in a private hospital developed a vaginitis. They were in doubt as to whether to discharge the child and had the discharge examined. This proved to be a case of pure proteus infection. It was interesting to know that one could get this kind of an infection.

Dr. Alfred F. Hess, in reply to Dr. Talbot's question, said the presence of a discharge was very variable; sometimes it was present for a very short time—about two weeks. These cases were not all due to the gonococcus; they had had cases that were not gonococcus infections. He hoped this question would be taken up by others and that they would test out these provocative inoculations for themselves.

EARLY SYMPTOMS OF PROTEIN SENSITIZATION IN INFANCY

Dr. B. Raymond Hoobler, Detroit, related his experience with subcutaneous, intravenous and intraperitoneal injections of a foreign protein in guinea pigs. These experiments had given them a great deal of information which he thought should be translated from the laboratory to practical use. Dr. Talbot had pointed out the relation between egg protein and asthma, and Dr. Schloss had shown the relation between foreign protein and eczema, and Schloss and Warthin the relation of anaphylaxis to gastroenteric disturbances. Guinea pigs sensitized to a foreign protein showed symptoms varying from the mildest to the most severe. The first effect of the sensitization was shown in peripheral irritation, the pigs being restless and scratching themselves. The second stage of anaphylaxis was a partial paralysis and muscular incoördination. The pigs rarely died in this stage. Following this there was sometimes a convulsive stage and the pig died during, or just after, a convulsion. When this stage was not reached recovery was usual and rapid. Comparing these symptoms with those seen in the human being it was found that there was a close analogy. The first symptoms in the human being, as in the guinea pigs, were manifested in peripheral irritation, as by a rash, either urticarial or erythematous. This was followed by apprehension, collapse, vomiting, great muscular weakness, and in rare instances by speedy death. In some subjects the symptoms might be similar but much milder in form. The severity of the symptoms depended on the amount of foreign protein injected. There was also frequently a family predisposition to some form of sensitization in the father, the mother, a brother or a sister. The substances which caused anaphylaxis were usually egg, milk, oatmeal, fish, etc. In the human being the first lesions on the skin might be urticarial, or erythematous, or only a single wheal, which might be mistaken for an insect bite, or again the rash might be miliary in type, and thought to be due to the irritation of the clothing, the chapping of the skin or one of those rashes formerly classified as intestinal rashes. There might also be vasomotor disturbances referable to the respiratory tract as sneezing, snuffling, etc. Or, again, there might be a dry cough, and yet in neither of these would the child show any pathologic lesion. This corresponded to one of the early symptoms in the guinea pig which might be seen to pull and scratch his nose. There might also be wheezing, which might precede the asthmatic attack by months. Asthmatic attacks were often very persistent and then again disappeared as suddenly as they had come. There were also often acute digestive disturbances and nervous symptoms, as irritability, fretfulness and sleeplessness, somewhat akin to the symptoms seen in the animal. All of these symptoms might come and go with great rapidity. Fortunately all these symptoms did not occur in the same child. Certain nutritional disorders might be due to the biologic character of the food. Many of the symptoms mentioned as having been observed in anaphylaxis were also symptoms of other diseases, but when one had the group of symptoms outlined and they recurred from time to time, if taken together they would be very suggestive of anaphylaxis and this condition should be taken into consideration, since it was very important that it be recognized early.

DR. OSCAR M. SCHLOSS, New York, said he believed that if we granted the existence of an acute explosive type of anaphylaxis it was only reasonable to believe that there might be a milder type which differed from the acute type only by reason of the fact that the symptoms were more mild. The difficulty lay in obtaining definite proof that many of the milder disturbances were due to food protein as there was no definite evidence that such was the case. They had made tests but the results were inconclusive. They had also tried to sensitize passively a number of such children. The question of heredity was of interest. In the cases which he had reported there was in the vast majority of instances evidence that one of the parents or some other member of the family showed an allied condition. There were also instances in which an infant showed anapyhlaxis the first time it got a food containing a foreign protein different from that it had been receiving. With reference to the question of asthma, Dr. Schloss said he had investigated a number of cases of bronchial asthma and on the whole the result had been very disappointing. They had not excluded the possibility that many cases might be due to food substances, but no definite proof had been forthcoming that they were due to such food substances, so the only thing to do at present was to leave the question open. He had seen 4 cases, however, 3 due to egg and one to milk, in which the usual treatment of desensitization gave good results.

Dr. Fritz B. Talbot, Boston, said that in discussing this subject it should be remembered that the condition of anaphylaxis was relatively rare. In looking over their hospital records he had found relatively few cases of asthma, but a great many skin cases that might have been due to anaphylactic action. In regard to what Dr. Hoobler had said, the symptoms he had described were interesting, but it seemed to him that Dr. Hoobler was scarcely justified in all of his conclusions. For himself, he had been unable to find any connection between a mild erythema and anaphylaxis; in cases of urticaria he believed all were due to some form of anaphylaxis; the miliary rashes he had been unable to connect with any form of anaphylaxis; rough skin in some instances might be due to anaphylaxis, it seemed to have such a connection in one case that came under his observation. One form of anaphylaxis he had seen cured by reducing the amount of fat in the food. Some of the cases that gave positive skin reactions to certain proteins did not get well when that form of protein was taken out of the food which had given the skin reaction. With reference to the symptoms of common cold, snuffles, etc., Dr. Talbot said he should attribute these to adenoids; where there were symptoms connected with the respiratory system, such as wheezing, and with nothing else to explain them, it might be found that the wheezing was due to the typical râles of bronchitis, though in a few instances these symptoms might be of anaphylactic origin. He had seen a few cases in which an attack of croup could be brought on by giving raw or soft cooked eggs. But on the other hand, the symptoms of croup described by the parent might be those of pharyngeal diphtheria. Some of the symptoms of indigestion might be of anaphylactic origin, but this was one of the last things in connection with anaphylaxis that would be proven. Some of his patients had described of their own accord as symptoms of anaphylaxis, when taking the protein to which they were sensitized, a sensation that the food stayed in their throats and some said it gave them a shivering sensation.

THE CALCIUM METABOLISM IN A CASE OF HEMOPHILIA

Dr. David M. Cowie and Dr. C. H. Laws, Ann Arbor, presented a study of this case in which there was a family history of bleeding in three sisters. In this case the calcium content of the blood was about normal, and the average coagulation time of the blood was two and one-half hours. During a period in which calcium lactate was administered the coagulation time decreased to two hours, but as soon as the administration of the calcium lactate was discontinued the coagulation time returned to two and one-half hours. During the administration of the calcium lactate the calcium content of the blood gradually increased from 1.665 per 1,000 c.c. of blood to 1.745 per 1,000 c.c. of blood, but as soon as the administration of the calcium was discontinued the calcium content of the blood returned to its normal condition.

Dr. Alfred F. Hess said that so far as he knew this was the second case in which the calcium metabolism was studied in hemophilia. Of the cases which he had reported some time ago one was a normal child and one was encephalic. The normal child showed much the same things as the case just reported. There was an increased calcium content of the blood and a hastened coagulation time while calcium was being administered by the mouth. When calcium was added to the blood of the patient *in vitro* there was also an increased coagulation time. In cases of hemophilia examination should also be made of the blood platelets as these might also be abnormal in this condition.

Dr. David M. Cowie stated that the blood platelets were normal in this case. No examination was made as to the effect of the calcium *in vitro*. They had been particularly interested in working on the blood in getting a method by which they could handle the blood more easily, and they had succeeded in finding one by which they could get a perfectly clear liquid like water and an organized clot within fifteen or twenty minutes

THE CALCIUM CONTENT OF THE BLOOD IN RACHITIS AND TETANY

Dr. John Howland and Dr. W. McKim Marriott, Baltimore, presented this study, in which, after describing the changes in the bones that were incident to rachitis, they stated that all the theories as to the causation of rickets were more or less unsatisfactory. Thus far there had been no study made to determine definitely whether there was sufficient calcium present in the blood of rachitic patients or not. They had devised a method that would enable one to find the calcium in ½ a cm. of blood serum. They had studied 11 cases of rachitis and had determined the calcium content of the blood in a number of control cases. They had found that in the majority of the cases the calcium varied between 10 and 11 mgs. per 100 c.c. of blood serum. In rachitis they found in some instances a reduction of the calcium, but it was never less than 9 mgs. per 100 c.c. of blood serum, and very often it was between 10 and 11, so that it could be said that rachitis did not depend upon an insufficient amount of calcium in the blood.

The calcium content of the blood seemed to have a definite relation to the onset of tetany. If this were true it might be that some severe symptoms such as muscular spasms might be controlled by calcium in large doses. The determination of the calcium in the blood of infants with tetany was made in 7 cases with very accurate technic. All had shown a marked reduction in the amount of calcium. The calcium content instead of being 10 or 11 mgs. per 100 c.c. of blood serum varied in these cases of tetany between 6 and 7 mgs. An analysis was made in the case of two children with no active symptoms of tetany but who showed the characteristic electric reaction; in one of these there was a moderate reduction of calcium while in the other there was no reduction in the calcium. When the child lost the evidences of tetany the calcium content of the blood returned to normal. They found that children, like dogs, developed tetany after thyroidectomy, that convulsions in dogs and children presented practically the same appearance, and that the calcium content of the blood serum was usually the same, between 5 and 7 mgs. per 100 c.c. of serum. It seemed apparent, therefore, that parathyroidectomy exerted a distinct effect on the calcium content of the blood.

Dr. David Cowie said he would like to ask whether Dr. Howland had made all his determinations on the blood serum. They had made their determinations on the whole blood and he would like to point out that the blood platelets absorbed a certain amount of calcium. It was interesting to see the differences in the observations on the serum and on the whole blood. With reference to the calcium reduction in tetany there seemed to be two classes of cases, some in which there was a reduction of the calcium and some in which the calcium content was not disturbed or was but slightly lower. The calcium content in normal individuals varied a great deal and much work would have to be done to determine the normal calcium content of the blood.

Dr. J. P. Sedgewick, Minneapolis, said that he too had found that there was an increase in the calcium content of the blood following a high intake of calcium in the food, and he could support Dr. Laws' observations. One could now give a definite reason for the lowering of the electric reaction by the administration of 5 grains of calcium chloride a day. The calcium has an immediate effect on the electric reaction. He employed calcium chloride because it contained twice as much calcium as calcium lactate. One also got a marked result in spasmophilia from the use of calcium.

Dr. L. Emmet Holt said the findings of Dr. Howland in these cases of tetany were very well borne out by the effects of the use of magnesium sulphate in hypodermic injections. Giving calcium by mouth was very uncertain in its results, but after giving magnesium sulphate there was evidence that some very definite result had been produced. One might give a hypodermic of from 5 to 20 grains of Epsom salts to an infant of four months, or from 15 to 30 grains to one of twelve months of age, and the results would be manifested within twenty minutes. The anhydrous salt was twice as strong as the magnesium sulphate and in prescribing one should always specify whether he wished the anhydrous salt or magnesium sulphate.

Dr. McKim Marriott thought it was preferable to determine the calcium content in the blood serum rather than in the whole blood. They had perfected their method so that it could be applied to ½ a cm. of blood serum. It was perfectly true that the clot contained a small amount of calcium, but the calcium content of the serum was extremely constant.

EARLY MORNING TOXIC VOMITING IN CHILDREN

Dr. Thomas S. Southworth, New York, said the purpose of this communication was to direct attention briefly to the vomiting of children, which not infrequently occurred in the early morning either before or soon after the first feeding. This vomiting was often of toxic origin as indicated by the fact that the vomitus after the long night period contained no food residue, if it occurred before the first morning feeding; if after this feeding it contained only food from this meal. It was sharply distinguished from the vomiting of undigested and fermenting food in cases in which there was failure of gastric digestion which was immediately responsible for the emesis. This latter type of vomiting was more prone to occur later in the day after the stomach had been taxed by one or more feedings. When the chemistry of the intestinal tract went wrong, either slowly and cumulatively, as doubtless usually obtains in recurrent vomiting, or more abruptly with the fermentative or putrefactive processes set up by the aid of bacterial agencies, absorption of some of the products into the circulation was certain. Fermentative processes, owing to the irritation caused were more likely to set up a conservative diarrhea in an effort at elimination. With free drainage of the intestinal tract, there was, without doubt, excretion through the mucosa of the intestine which served to some extent to offset the absorption. But with an actual or a relative constipation, and consequently lowered elimination, the positive balance of absorption gained the upper hand. The effect of milder degrees of intestinal disturbance were familiar in the dullness, depression of spirits, headache, lack of appetite, coated tongue, and even some feeling of nausea in both adults and children. If not too habitual this syndrome was promptly relieved by free catharsis. The toxemia of recurrent vomiting was probably of gradual and cumulative evolution, coming to a head with the development of marked or relative constipation, or precipitated by some unusual factor—as fatigue, nervous strain, the onset of one of the infectious diseases, or the taking of an anesthetic. Here elimination was slow and vomiting prolonged. Fever was not a constant symptom. With a more active and fulminating toxic absorption, such as we might assume occurs with an acute putrefactive process in the intestine, fever was a usual accompaniment, often rising sharply, and if a conservative diarrhea was not quickly established the gastric mucosa participated in the effort at elimination. In the early morning vomiting it seemed hardly probable that gastric stasis, which so often accompanied acute indigestion or the onset of febrile conditions, could be overcome in the final hours of the night, and the stomach be completely emptied of all vestiges of food before the early morning vomiting occurred. It was much more plausible to assume that in the early morning type the disturbance of digestion had been primarily intestinal, not gastric. There was an attempt at elimination of absorbed toxic principles by the gastric mucosa, and these accumulated during sleep, when all the reflex sensations were more or less deadened by slumber and assert their presence on awakening in nausea and vomiting. Reaccumulation in the stomach of sufficient quantities to cause a recurrence of such vomiting was comparatively rare during the waking hours. The vomiting had not the persistent character of the true recurrent type. This might be readily due to the difference in the nature of the toxic products in the two conditions, their quantity in the circulation, or their rate of excretion. So common was it for children to vomit in the morning, if they vomit at all during the course of minor illnesses, and not toward night, and so frequently will milk, if given at the first feeding, be ejected in large masses, that it had become the writer's habit, in the presence of fever to suspect toxemia, and to order for the first morning feeding broth or broth and barley gruel. By thus avoiding the formation of acid coagula he felt that he had often averted the tendency. Dilution of the stomach contents or the demulcent action of the barley when added might play some part in this result. A further characteristic of both toxic types of vomiting, as distinguished from that of acute gastric indigestion, was the quicker recovery of the digestive functions of the stomach. In the toxic type the stomach functions are only slightly impaired, and as soon as the elimination has been accomplished by free catharsis, and vomiting had ceased, simple food would be received and digested. Appetite also returned more promptly. The extreme caution in resuming feeding after such an attack was unnecessary. These children should be fed simply as soon as the vomiting ceases. This form of vomiting did not seem to have received special attention and the observations were presented with a view to inviting discussion.

Dr. T. DeWitt Sherman, Buffalo, asked Dr. Southworth if he had had any gastric analyses made in any of these cases, whether any of these showed a hyperchlorhydria and whether there might be a neurotic element involved. It would also be interesting to know whether he had tested for acetone in the urine early in the morning. Dr. Sherman said he had had quite a number of similar cases and invariably found acetone in the urine.

Dr. Isaac Abt, Chicago, said the vomiting might be the effect of something outside the gastric tract. The chronic alcoholic vomited because of a nasal pharyngitis. It seemed that in several of the cases that Dr. Southworth referred to with gastro-intestinal symptoms the vomiting might be explained as possibly induced by a pharyngitis.

Dr. Thomas S. Southworth, New York, said he had not made the gastric analyses to which Dr. Sherman had referred. It was extremely probable that some of them might have had hyperchlorhydria. In some of these children there was a definite odor of acetone, but he had not made an examination of the urine. As to what Dr. Abt had said, if he had seen these cases he would not question that the cases were other than as he had stated in the paper. A child coughed a great deal from the presence of mucus in the pharynx, but the type of cases to which he referred had not coughed, so that this could not have been the cause of the early morning vomiting.

A STUDY OF THE ETIOLOGY OF CHOREA

Dr. John Lovett Morse and Dr. Cleaveland Floyd, Boston, stated that this study was undertaken primarily to determine, if possible, the parts which syphilis and bacterial infection play in the etiology of chorea. It seemed from a study of the literature that there was very little evidence in favor of the syphilitic origin of chorea and much against it. In their investigations there was nothing whatever in the history of 21 or 81 per cent. of our 26 cases to suggest syphilis. In the others there was a history of miscarriages. No one of the patients was born prematurely. The blood of 3 of the 5 children in whose families there was a history of miscarriages gave a negative Wassermann test. The spinal fluid was not tested in these 3 children. The blood of one gave a positive Wassermann reaction, of the other a doubtful reaction on three occasions, while the spinal fluid was negative at one examination. None of the children showed any of the stigmata of syphilis. In only 3 of these cases was there anything in the family history even suggesting syphilis. Of the 25 children in this series 21, or 84 per cent., gave a positive skin reaction to tuberculin. It would be absurd to assume that tuberculosis was the cause of chorea in these 21 children. The conclusion is therefore justifiable that syphilis seldom, if ever, plays an active part in the etiology of chorea. The close clinical relationship between acute articular rheumatism, endocarditis and chorea, taken in connection with the present conception that acute articular rheumatism and acute endocarditis are bacterial in origin, had suggested that chorea was also bacterial in origin, and perhaps caused by the same or a similar organism. Their cases confirmed the general belief as to the frequency of the association of chorea with rheumatism and endocarditis; 7, or 37 per cent., of them having had rheumatism in the past or in connection with the chorea. Six of them had acute endocarditis, and 6 chronic valvular lesions, a total of 12, or 46 per cent. The tonsils were normal in but 11 cases, while they were diseased in 11, or 42 per cent., and had been removed on account of disease in 4 others. The teeth were normal in but 7; pyorrhea was present in 2 of these children, and definite pus pockets were found in 3 others when the teeth were extracted. Certain investigators had found organisms in the blood during life, and from a review of the literature on this subject it seems that the results thus far obtained from blood cultures were inconsistent and inconclusive. In almost every case in which organisms have been found there has been some other complicating condition amply sufficient to account for the presence of organisms in the blood. The absence of organisms in the blood did not prove, however, that chorea was not caused by bacteria, because, although the cause of the disease, they might have been absent from the blood at the time the cultures were made, and the methods of cultivation used might not have been suitable for the growth of the organisms if present. There were practically no data as to the bacteriology of the spinal fluid or the cerebrospinal fluid in chorea during life. During the past year they had made a study of 26 cases of chorea in the acute stage of the disease with a view of determining the presence of an infecting agent in the blood stream and cerebrospinal fluid, the frequency with which it could be obtained, and its cultural characteristics. About 5 c.c. of cerebrospinal fluid and 5 c.c. of blood were secured where it was possible. Various media and aerobic and anaerobic methods were used. In every instance the cultures as well as the smears from the cerebrospinal fluid were negative. Blood cultures were negative in 26 instances, even after several weeks of incubation and subculturing. In 5 cases organisms were found. In 1 case a small bacillus, diphtheroid in type, appeared. This was a Gram negative organism and was not pathogenic for rabbits, even when large doses were given intravenously. Diplococci were found in 1 case, but no organisms were cultivated. In both of these instances the tonsils were enlarged and the teeth carious. In 2 other cases short chains of cocci appeared, but all efforts at subculturing failed. In these 2 cases the tonsils were normal, but the teeth carious. In another case positive blood serum cultures were obtained after ten days of incubation. This patient had acute endocarditis and had several attacks of rheumatism. The organisms in this case were Gram positive streptococcus. This organism was now readily subcultured and its characteristics had remained unchanged through ten generations. Intravenous inoculations into rabbits killed the animals in twenty-four to forty-eight hours. Autopsies showed a general septicemia and cultures from the heart's blood and knee joints gave good growth of streptococci. Four other rabbits were given intravenous inoculations, and all showed lameness and difficulty in walking and standing, and restlessness on handling of the joints. Some swelling of the knees was also noted. The fact that the streptococcus obtained from the fifth case caused lesions in the endocardium and joints of rabbits made it very probable that it was the cause of the endocarditis in the child. The fact that it caused lesions in the brain and meninges of the rabbits similar to those found in the brain and meninges of fatal cases of chorea suggested that it was also the cause of the chorea in the child. Further than this it was not safe to go. The absence of microörganisms in the cerebrospinal fluid was an argument against the bacterial origin of chorea, because it would be reasonable to suppose that in a disease in which the lesions were located in the nervous system, the causative organism would be more constantly present and more abundant in the cerebrospinal fluid than in the blood. However, the absence of organisms in these cases might be explained by the fact that most of them were mild or only moderately severe in type. It might also be possible that the failure to detect the organisms more often in the blood or spinal fluid might have been due to the fact that they were only temporarily present in the blood stream and tended to locate themselves in the meninges, endocardium or joints. While there is much that points to a microörganism, or a group of microörganisms, as the cause of chorea, the bacterial origin of chorea was not yet proven.

Dr. Henry Koplik, New York, said he agreed with Dr. Morse's conclusions with reference to syphilis and chorea. He had made a number of blood examinations in cases of chorea and in all cases so far had had negative results, and so felt that he could endorse Dr. Morse's conclusions. The streptococcus might possibly have been the cause of the endocarditis. He had had a number of cases of chorea in which endocarditis came in secondarily. It seemed that our methods of blood culture must still be improved and then again it might be that the bacteria disappeared at a certain period and left a toxin.

Dr. Isaac Abt, Chicago, said he had gone over his hospital records and collected 226 cases and they had very infrequently obtained a history of rheumatism, infection or any febrile condition. Over 80 had chorea for a long time without any other condition. It was certainly not true that all those said to have chorea had an infectious chorea; they might have a nervous condition not connected with infection.

Dr. L. E. La Fétra, New York, said that at Bellevue Hospital several cultures were made from the blood of choreic patients and the streptococcus viridans was recovered. The technic employed could not be very exact, for in the same laboratory and with the same blood some obtained microörganisms and some did not.

Dr. Abraham Jacobi, New York, said he did not doubt that Dr. Morse's paper contained a great deal about the therapeutics in chorea, for he took it for granted that all looked to therapeutics as the end of their studies. He had nothing to say with reference to the connection between rheumatism, endocarditis and chorea that had not been heard over forty years ago, but he said he wished to call attention to a paper which would be printed in the Journal of the American Medical Association, in which Dr. A. L. Goodman, attending physician to the German Hospital in New York, tells of a method by which he cures chorea in a few days. This method consisted in taking a sufficient quantity of blood from a choreic child, say 30 or 40 c.c., taking the serum from this blood, amounting to less than one-half this quantity, and then injecting that serum into the same child. This treatment was a very remarkable one and he did not wish to accept it, but the cases improved within twenty-four hours and still more within forty-eight hours. He thought he should make this communication so that his hearers could employ it, for it was of priceless value.

THE EFFECT OF SUBCUTANEOUS INJECTIONS OF MAGNESIUM SULPHATE IN CHOREA

DR. HENRY HEIMAN, New York, said that though chorea had been known for centuries the results of treatment had been disappointing. Stimulated by the work of Meltzer, who used magnesium sulphate in the treatment of tetanus with gratifying results, they tried a similar method in 5 successive cases of chorea. They used a sterile solution of 25 per cent. magnesium sulphate, giving three injections daily for fifteen days. There were certain objections to this method of treatment: (1) The possibility of inflammatory reaction, (2) young children might become unduly excited by the treatment itself, (3) the danger of breaking the needle in the tissues, (4) albuminuria. From his experience with these cases the conclusion seems justifiable that subcutaneous injections of magnesium sulphate, though only employed in 5 cases, did not produce sufficient improvement to justify further trial.

THE PROGNOSIS AND TREATMENT OF BANTI'S DISEASE IN CHILDREN

DR. EDWIN E. GRAHAM, Philadelphia, said that splenic anemia was essentially a chronic disease which usually lasted for about five years, during which time the symptoms were mild;

after this period for two or three years they steadily become worse, until, finally, the syndrome of Banti's disease developed, and the case rapidly progressed to a fatal termination. Cases had been reported which persisted for ten to twenty years, but the juvenile type of this disease tended to run a more acute course than the adult form. If not treated, or if treated only medicinally, splenic anemia was almost invariably fatal. Under surgical treatment the prognosis was rather more favorable than otherwise, the outlook depending upon the duration of the disease at the time the spleen was removed. If done early, splenectomy was attended by slight mortality, and in uncomplicated cases a cure might be expected; but when the disease was complicated by other affections of chronic infectious nature, the value of the operation was questionable. Splenectomy was even more advantageous in children than in adults. After the removal of the spleen in most cases the blood picture more or less approached normal, but in a few cases it might vary greatly, so that five years might elapse before the differential count became normal. When Banti's syndrome was well established the prognosis was most unfavorable, even though splenectomy be performed, for the vital organs had become the seat of degenerative changes and the liver was cirrhotic. Until the year 1908, the mortality following splenectomy for splenic anemia was 17 per cent.; since 1908, in a series of 47 splenectomies, there were five deaths, this mortality being little above 10 per cent. But these figures were based on cases in which the symptom-complex of Banti's disease was not present. In splenic anemia there was evidently an infectious or toxic process going on in the spleen which caused fibrotic enlargement and the formation of splenic hemolysis. Therefore in these cases the removal of the spleen had ample justification, even though it was still a mooted question whether the favorable results of splenectomy were due to regeneration of corpuscles or to decreased hemolysis. If an abundance of iron was supplied to the system after the removal of the spleen, which was the organ in which iron metabolism took place, polycythemia would result in many cases, and an increase in red cells was always noted at varying intervals after operation; therefore, in splenic anemia iron was undoubtedly indicated both theoretically and practically. It was also believed that the cirrhotic changes which in Banti's disease take place in the liver are due to toxins produced by the spleen; this explained the favorable influence of splenectomy on the liver. Splenectomy was both useless and dangerous in cases in which the hemoglobin was below 30 per cent., and the red blood cells below 2,000,000. The operation should, as a rule, be attempted only when there was no edema, no parenchymatous nephritis, no serious degenerative change in the liver, and while the patient was still able to go about. In severe cases blood transfusion, if done shortly before the splenectomy, seemed to increase the ability of the child to withstand the shock of the operation. The operation of choice in Banti's disease is Talma's operation. In 25 per cent. of the cases of splenectomy for Banti's disease there was afterwards pain in the long bones, this being probably due to hyperplasia of the red bone marrow. Hemorrhages from the stomach and intestines were most likely to occur for the first two weeks after operation and must be treated by complete rest for the upper abdomen, by injections of saline or of blood serum, or by direct transfusion.

Dr. Graham reports in detail a case of splenic anemia in a child of seven years. She was the ninth child and none of the others showed any similar tendency, the family history being absolutely negative. The child gave a history of nose-bleed dating back five years, and, more recently, of subcutaneous hemorrhages. Physical examination revealed a presystolic murmur at the mitral area with a sharp second sound. The pulmonic sound was accentuated and the heart was displaced upward. The splenic outline was visible on the right side. Splenic dullness began at the fifth interspace in the midaxillary line, beginning about two fingers above the xyphoid and curved out to the right until at the level of the umbilicus it was approximately three inches from the spot and filled almost the entire abdomen. The detailed blood count was presented and shows briefly hemoglobin markedly reduced, red cells usually not below 3,000,000, slight poikilocytosis, and the presence of normoblasts. There was an actual leukopenia.

Third Day, May 10, 1916

THE ENERGY METABOLISM OF A CRETIN

Dr. Fritz B. Talbot, Boston, presented this study, which he had made on a typical cretin, three years and eight months of age. The child was studied in the respiratory chamber devised by Benedict in the Laboratory of the Carnegie Institute in Washington. The basal metabolism per kilogram body weight of this child was 40½ calories per square meter body surface, or 898 calories per twenty-four hours. (Lissauer.) In the absence of normal data for children of the same age, this metabolism was compared with that of a normal eight months baby and a normal ten months baby. It was found that the metabolism of the cretin was decidedly lower than that of the two normal babies. Unfortunately, results after treatment with thyroid extract had not been sufficiently accurate to be of use. These results were consistent with those of Magnus Levy and the more recent work of Du Bois in Lusk's Laboratory. The practical application of these findings was that the cretin required less food than children with sufficient thyroid activity and after treatment with thyroid extract would require more food than before treatment.

FAMILIAL ICTERUS OF THE NEWBORN

Dr. Isaac A. Abt, Chicago, stated that this disease had noththing in common with Buhl's or Winckel's disease. There was no evidence to prove that it was due to a septic process. It was not present at birth; it occurred during the first few days of life. In none of the cases reported was there a history of birth injury; it did not seem to be due to the toxemia of pregnancy. One might say that the children were in a sense defective and became very soon incapacitated to carry on extrauterine life. The disease occurred in successive pregnancies, occasionally several normal children were born and then several died in a few days after birth as the result of grave and progressive icterus. As a rule there was no hereditary influence. The disease usually began on the first or second day of life and rapidly increased in severity. The symptoms were described briefly by Pfannensteil as follows: Catarrhal condition of the mucous membrane, sometimes with bloody discharge; the stools were catarrhal and frequent; the urine contained bile pigment, and the patient showed meningeal irritation. At the onset there might be hyperemia of the skin. If the disease continued hemorrhages from the various mucous surfaces into the skin and from the umbilicus occurred and death soon followed from collapse. The disease bore no relation to syphilis and had nothing in common with family jaundice. Isolated cases had been reported from time to time in the literature, but the writer had encountered examples of familial icterus in the newborn in two families. The first case occurred in an Italian family, the father and mother both being twenty-eight years of age and having lived in this country ten years. There seemed to be nothing in the history of the parents or grandparents that was in any way connected with the condition in this infant. The mother had borne 5 children, of whom 2 were living and 3 dead. The 2 eldest children had always been well. The third baby seemed strong and robust at birth, developed jaundice on the second day and died on the third day. The history of the fourth child was similar and the course of the fifth did not differ materially from these.

The second case occurred in a Russian family. In this instance the mother six years ago had had an operation at which the gall bladder was removed. Two or three months after the gall bladder operation she had had her tonsils removed. She was about thirty-two years of age and the father three years her senior. She had borne 6 children. The first child has chronic nephritis and was eleven years of age. The second child was living and well. The third pregnancy resulted in miscarriage. The fourth child became jaundiced on the second day, was seized by convulsions, had frequent stools, became more intensely jaundiced, and died on the third day. The fifth child, whom the writer had the privilege of overseeing, gave a similar history. An autopsy was performed and showed some enlargement of the liver and spleen, though no pathologic changes of any moment could be noted and bacteriologic examinations showed the tissues to be sterile. The bile passages were of normal size and showed no obstruction. A sixth child became icteric on the second day, was very somnolent and toxic, but showed no hemorrhages. The condition of the child seemed grave. On the fifth day a slight improvement was noted and from this time the jaundice had gradually disappeared and the baby was now over a year old and unusually bright and happy.

Dr. Wilder Tileston, New Haven, called attention to an interesting feature of these cases and that was the yellow icteric staining of the base of the brain which was never seen in jaundice, and which might be correlated with the nervous symptoms. Dr. Tileston asked Dr. Abt whether there was any fragility of the red cells in his cases. The red cells had been tested in chronic family jaundice and there was a fragility of the red cells.

Dr. T. DeWitt Sherman, Buffalo, said it had occurred to him that it might be possible that jaundice and the allied conditions in infants might be due to the chloroform administered to the mother during labor. It was well known that chloroform produced hyalin and fatty degeneration and that its effects were concentrated on the liver and kidneys. It might be well to take up this matter and see how much chloroform these mothers of icteric babies had during labor; it might be that they had received a great deal and that it had had a deleterious effect on the infants. Dr. Sherman asked Dr. Abt if he knew anything about the amount of chloroform that these mothers had received.

Dr. Isaac Abt, Chicago, said he had examined the blood of one or two infants, but found no fragility or marked alteration in the red cells. His impression was that neither of these mothers had received any chloroform.

(*a*) PERTUSSIS. (*b*) MEASLES, PERTUSSIS, TEMPORARY CHEST DEFORMITY. (*c*) PERTUSSIS, MEASLES, PNEUMONIA

Dr. P. J. Eaton and Dr. E. B. Woods, Pittsburgh, reported these cases simply as showing the mix-up of contagious diseases that might take place in a family. Dr. Eaton said he was called to see a child with measles in a family in which 2 other children were about half way through whooping-cough. The measles disappeared, but there followed a bulging of the chest wall. There was a gradual diminution of this chest deformity. The measles were treated by cool, fresh air and vaccines. While visiting this child one of the children with whooping-cough contracted measles, pneumonia developed, and the child died. The other child was exposed and was watched daily, but did not get measles. These cases simply showed how a double infection might work out in a family.

SCARLET FEVER AND MEASLES OCCURRING SIMULTANEOUSLY IN THE SAME INDIVIDUAL, THE OTHER CHILDREN OF THE FAMILY ACQUIRING MEASLES ONLY

Dr. D. J. Milton Miller, Atlantic City, reported these cases, not because of their great rarity, but because they were interesting. It had been commonly thought that if an individual was suffering from one infection he might be immune to others, but this was a mistake. A patient suffering with one infection became more susceptible to other diseases. It has been shown that when one of the diseases, measles, scarlet fever, pertussis or mumps occurred one or more of the others was very likely to follow at short intervals; at other times they might be concurrent from the outset. In a case of measles-scarlet fever it might be very difficult to make the diagnosis. The writer reviewed such a case, which gave the symptoms of measles rather than of scarlet fever, but on the tenth day desquamation began and there was also an otitis media. There was the typical scarlatinal form of desquamation. The sister of this child was not isolated and acquired measles only, but not scarlet fever. A third child, who never came into contact with the patient, acquired measles, and a fourth child also had a characteristic measles rash. The 3 had only measles, but the first child had a double infection, measles and scarlet fever, and not measles followed by scarlet fever.

Dr. Matthias Nicoll, New York, said the desquamation of scarlet fever was not always absolutely typical; he had seen cases of measles in which there was sheet desquamation. There was no question about the single infectious cases; the other case was suggestive, but he did not feel that it was absolutely proven that there was the double infection.

Dr. Miller said that from his experience with eruptive diseases he had observed that the peculiar desquamation at the fingernails was not seen in any other disease than scarlet fever, and his diagnosis had rested to a large extent on that sign.

OBSERVATIONS OF MEASLES

Dr. Charles Herrman, New York, read this paper. The deaths reported as due to measles gave an inadequate idea of the real number caused by this disease. A large number died from a complicating bronchopneumonia, especially between the ages of one and two years. This was suggested by the parallelism between the curve of morbidity from measles and the curve of mortality from bronchopneumonia between one and two years. In a series of 300 secondary cases of measles observed by Dr. Herrman the fever appeared on the tenth or eleventh day from the time of infection in 56 per cent.; catarrhal manifestations on the eleventh or twelfth day in 60 per cent.; the tonsillar spots on the ninth to the thirteenth day; the Koplik spots on the eleventh or twelfth day in 54 per cent.; and the eruption on the twelfth to the fourteenth day in 67 per cent. The catarrh was present in 7.2 per cent. on or before the tenth day, the Koplik spots in 12.8, and the tonsillar spots in 34 per cent. In 4 per cent. of the cases in which the tonsillar spots were present, they were seen as early as the seventh day, and in a few cases the tonsillar spots were present in the patients who did not show any Koplik spots. The presence of the tonsillar spots would be found valuable in schools, hospitals and asylums in detecting and isolating the patients early. Infants under two months of age were absolutely immune. This immunity gradually became less marked, so that at eight months it had entirely disappeared. This gradual disappearance was shown by the longer period of incubation. In 63 under eight months of age the eruption appeared in only 42.5 per cent. on or before the fourteenth day, whereas, in 81.4 per cent. of those over eight months the eruption appeared at that time. In infants between five and eight months the disease was usually milder. This was also shown by the fact that only 41 per cent. of these lost weight, whereas, of those between eight months and two years 76 per cent. showed such a loss. The immunity was probably conveyed through the placental circulation; only those infants whose mothers had had the disease seemed to enjoy it. Infants between three and five months who had been in intimate contact with measles and did not contract it, sometimes were not infected when exposed later in life.

Dr. Henry Koplik said the Koplik sign might be seen five days before the eruption occurred and there was absolutely no reaction except a slight fever during all of this time, but one could see the Koplik spots in the mouth.

Dr. McC. Hamill asked Dr. Herrman if he implied that it would be a good thing to expose a child under five months of age to measles.

Dr. L. Emmett Holt said a child five weeks old was supposed to be immune to measles, but he had seen such a child promptly develop measles when exposed.

Dr. Charles Herrman, New York, said one could not be absolutely sure that a child would not contract the disease, but when one considered the 1,000 cases exposed he could understand how rarely it had happened. Dr. Herrman said he would not put himself on record as recommending that a child should be exposed to an infectious disease.

THE BACTERIOLOGY OF THE URINE IN HEALTHY CHILDREN AND THOSE SUFFERING FROM EXTRA-URINARY INFECTION

DR. HENRY F. HELMHOLTZ, Chicago, reviewed the facts with regard to pyelocystitis in infancy and childhood that have been pretty well established, namely, that the infection was very much more common in girls than in boys, that the infecting organism was most frequently the bacillus coli, and that the symptomatology of the condition is so indefinite as to make a diagnosis practically entirely dependent on the examination of the urine. Regarding the mode of infection there was considerable difference of opinion. The main facts in favor of the urethral route were the predominance of the cases in girls, the shortness of the urethra, and the fact that the orifice of the urethra was constantly contaminated with colon bacilli. The question as to the mode of infection was, however, far from being settled. In order to get an idea of the field involved it seemed essential first of all to determine the bacteriology of the normal urine and urethra and with this object the bacteriologic findings of catheterized specimens of urine taken from 30 infants and from 31 girls over two years of age are recorded. The catheterized specimens were obtained by a very careful technique and collected in three sterile tubes, so as to determine the difference between the first and last urine passed. In the course of a few experiments tubes one and two were found to be practically identical, so that in the majority of cultures taken only one and three were used. No. 1 was inoculated in a deep dextrose agar tube and on litmus lactose plate. No. 2 was was grown on a litmus lactose plate, a blood agar plate, and in deep blood agar tubes. The tabulated results showed that of 12 normal cases 5 had sterile urine. Of 5 specimens that were not sterile, 3 showed one organism per c.c. and 2 three organisms per c.c.; 2 had organisms in the first portion of the urine, but none in the last.

In summarizing the results of these examinations it was found that in 119 specimens of carefully catheterized urine from 61 different individuals, 61 were sterile and 58 contained bacteria.

Of those from the normal infants, 13 were sterile and 11 contained bacteria. Of 13 extraurinary infections under two years of age, 10 were sterile and 3 contained organisms. In the specimens from girls over two years of age, 35 were sterile and 27 contained organisms. The number of bacteria found in the first series was considerably larger than in the second series. This might be explained by the fact that in the older children one could cleanse the urethral orifice much easier than in the infant and introduce the catheter directly into the urethra. The bacterial flora was practically the same in both series, Gram positive staphylococci and pseudodiphtheria organisms predominating; the former were present in practically every case in which any organisms were found. In no instance were Gram negative bacilli found in such numbers in both specimens that it seemed probable that it was more than a contamination from the urethra. In conclusion it might be assumed on the evidence given that organisms of the colon group were not normal inhabitants of the female urethra and that in extraurinary infections occurring in the first two years of life the colon bacilli were frequently found in the urethra, that was, in about one-third of the cases. In girls over two years of age the urine was almost free from organisms and entirely free from bacilli of the colon group.

OXYCEPHALY: ITS OCCURRENCE IN TWO BROTHERS

Dr. W. W. Butterworth, New Orleans, reviewed the literature on this subject and stated that the classical symptoms of this condition were exophthalmos, pain and some disturbance of vision. An interesting feature in these 2 cases was the family history showing similar symptoms in the grandfather. It was very rare to find two brothers in the same family showing this condition and a history of a similar condition in a grandparent. These boys were not mentally deficient. The cranial picture was suggestive of the condition. The cause of this deformity had been variously attributed to early closure and ossification of the sutures, fetal rickets and hydrocephalus in early life.

Dr. Butterworth gave a lantern-slide demonstration, showing the bones of the skull in this condition. There was a peculiar mottling of the inner plate of the cranium. The X-ray of the joints showed that the bones were not normal. There was an enlargement of the condyles of the large bones and some enlargement of the bones of the face. The condition was rather rare.

MENINGITIS IN THE NEWBORN AND IN INFANTS UNDER THREE MONTHS OF AGE

Dr. Henry Koplik, New York, made this contribution. He said that meningitis in the newborn occurred sometimes secondary to general sepsis and sometimes as a primary infection. The symptomatology in the primary condition was very obscure. The child's head might be bruised during labor and one could not come to a conclusion as to the actual condition until the swelling has subsided. The signs applicable to older children were not applicable to these young babies. There was no rigidity, no bulging, no Babinski, and the child was in a condition of muscle clonus anyway. It was no wonder that a diagnosis was not made more frequently. He had concluded that he would try to find some characteristic symptoms. The convulsions might be simple or the child might only have slight twitchings. If there was a convulsion, this might be repeated or it might not be. He had observed 1 case in which there was only one convulsion, but there was very high fever, 105°F. or over, and there were remissions and then the fever might subside, and again it might not, if the disease was still in progress. Often the temperature might last for a week or ten days and then would come to a lower level and would run along at 100°F. or slightly above. The bulging of the fontanel was not present; indeed, in some cases there seemed to be a depression. Macewen's sign was very difficult to determine in very young babies. Some gave signs of fluid in the head and some did not. Sometimes after a very hard labor it was only later in the disease, after a week or ten days, that there was fluctuation and an increase in the quantity of fluid, noticed not only by the bulging, but by the tympanitic sign over the temple. Sometimes after a high forceps delivery the child might have a slight amount of blood in the urine and in such a child it was very difficult to decide whether one had simply a slight hemorrhage or a meningitis. In some cases no one knows what is the matter until the children are two or three months of age. Most of the hospital cases must have had the condition longer than the mothers suspected. The results of lumbar puncture in these cases were very interesting. The lumbar puncture in a series of 12 cases showed the presence of the streptococcus four times, the pneumococcus three times, the meningococcus three times. One case showed very distinctly that the meningitis was secondary to an arthritis. In the secondary cases he found a streptococcus in the blood. One case observed from the start began with a pyelitis and this got into the circulation and a coli meningitis was developed as a secondary infection. The fate of these babies was disheartening, for they all were fatal sooner or later. One case of meningitis in this series still lived, but in this case there was a marked hydrocephalus. All of these cases were treated by lumbar puncture, but young babies did not bear lumbar puncture well. As to how these babies get a meningococcus infection, it seems that the mode of infection may possibly be explained when we consider the methods of resuscitation, mouth to mouth suction, and introduction of the fingers into the child's mouth with the trauma that may be incident to this procedure. If the person who performs these manipulations is a meningitis carrier it is easy to see how infection may occur.

THE USE OF SALT SOLUTION BY THE BOWEL (MURPHY METHOD) IN INFANTS AND CHILDREN

Dr. Edwin E. Graham said the Murphy method of injecting saline solution by slow proctoclysis had been used for a few years past in adults suffering from many other conditions than peritonitis, and by medical practitioners as well as surgeons. His experience with it in certain conditions in infants and children had led him to believe that it is of much more value to the pediatrist than most of us are aware of. It has been most successfully employed in the highly toxic states of typhoid fever and pneumonia and appears to afford great relief, but in the later stages, after the heart has been affected by the toxemia, it must be used with great caution, when there is obstruction in the lungs and the blood pressure has become high. In the acute infectious diseases toxemia may be greatly influenced by the employment of the Murphy drip and in diphtheria and scarlet fever the resulting dilutions of the toxins is of the utmost importance and value in averting nephritic conditions. In uremia and suppression of urine slow proctoclysis promotes diuresis and thus dilutes the highly toxic and irritating materials which would otherwise be harmful to the kidneys. Generally speaking, in toxemia from any cause, whether it be autointoxication, mineral poisoning or septicemia, the judicious use of the salt solution by the bowel will prove of great value in treatment. If nephritis with edema is present the administration of salt solution by this method is unwise, although in a few such cases it has apparently been employed with success. The writer has been greatly impressed by the results of the employment of the Murphy drip in profuse diarrhea due to intestinal infection and in the summer diarrheas. In giving the proctoclysis there must be a low pressure and a good return. There should be a twelve-inch drop and the catheter should be introduced four or five inches into the bowel. The temperature of the water should be kept at 110°F. This treatment might be given over periods of from ten days to two weeks, provided periods of rest were given at intervals. In measuring the sodium chloride, to say one teaspoonful to a pint was very inaccurate; the preparation of the solution was important; it should be made with extreme accuracy.

MULTIPLE SCLEROSIS IN A CHILD FOUR AND ONE-HALF YEARS

Dr. George N. Acker and Dr. Joseph S. Wall, Washington, stated that this patient was a colored child, four and one-half years of age, who visited the out-patient department of the Children's Hospital March 2, 1916, complaining of "nervousness." The family and personal history revealed nothing of moment. The present trouble came on slowly. The mother did not notice it until her attention was called to it by friends. The patient had grown progressively worse until at the present time she was greatly troubled with shaking of the body and limbs, inability to sit still or walk, and total incapacity for feeding herself. The chief symptoms presented at the first examination were: nystagmus, shaking of the body, exaggeration of all reflexes, rapidity but not enlargement, of the heart. Ten days later these symptoms seemed to have grown worse. A week later she was admitted to the house service of the hospital. At this time her mental faculties seemed dulled, but she would answer simple questions requiring only two or three words. Her speech was thick, the so-called scanning speech (bradylalia) and markedly staccato. While lying in bed she was perfectly quiescent, but on any attempt to sit up the coarse muscular tremor involving the muscles of the neck, arms and trunk and to a lesser extent the legs manifested itself. There was a vertical oscillation of the head as well as lateral rotatory movements. She stood and walked only when partly supported by the nurse. The drinking test gave rise to a typical volitional tremor. The tongue shows marked tremor when protruded. There was marked elbow jerk, wrist jerk, and heightened epigastric reflex. The patellar jerks were greatly exaggerated. An ankle clonus was present in both extremities. The heat and cold sense were apparently normal except over the right thigh, where there was some dissociation of the senses. There was incontinence of urine and occasionally of feces. The urine was normal, except for the presence of a few white cells.

This case was presented because of the infrequent occurrence of multiple sclerosis in children. The writers were of the opinion that the case fell under the category of disseminated sclerosis. It measures up by the signs and symptoms with the syndrome of sclerosis. It gives evidence of rather widespread involvement of the nervous system with resulting impairment of function rather than a focal lesion, or collection of lesions, with much actual destruction of nerve elements, for there are no paralyses.

THE DANGER TO HOSPITAL EFFICIENCY FROM DIPHTHERIA CARRIERS

Dr. Samuel S. Adams and Dr. Frank Leech, Washington, reviewed the many factors which enter into hospital efficiency. There must be team work between the highest in authority and the most humble employees. To obtain hospital efficiency the following may be considered requisite: (1) The President of the Board of Directors of all hospitals should be chosen with a view to his personal interest in all things connected with the institution. He should be a man well trained in the handling of men and affairs. (2) The Executive Committee should be a body composed of those members of the directors who are in close touch with the interests of the institution from every viewpoint. A representative of the medical staff should always be present at their meetings to express the views of that body, with the idea of keeping harmony with all in authority. (3) Every hospital should have a trained medical superintendent, who should have exclusive control of all matters connected with the hospital. (4) A superintendent of nurses who had shown exceptional ability in her work as a teacher and director of young women should be chosen. (5) The members of the medical staff should be medical men, who have been promoted from dispensary work, or who, by reason of their attainments elsewhere, have shown particular aptitude for the positions to which they are appointed. (6) Hospital internes should be chosen by competitive examination and should have every opportunity to do work under the direction of the medical superintendent and the medical officers on duty. (7) Nurses should be chosen from applicants who have had sufficient preliminary education to assure their ability to grasp not only ward work, but also the lectures which they are compelled to attend. (8) Employees should be under the control of the superintendent and amenable to control and discipline by him. (9) Social workers should be provided for follow-up work, not only for the hospital, but for the out-patient department. (10) Efficiency experts should be engaged from time to time to check up the work and criticise the same, from the president of the Board of Directors to the orderly. If these suggestions were perfectly carried out it would be easy to look after the other details of hospital efficiency. Hospital efficiency resolves itself into doing everything for the comfort and cure of the patient.

The occurrence of 2 cases of diphtheria in our hospital led to a culture of every individual in the house, as a result of which 51 positive cultures were found out of a total of 100, including all employees, nurses and internes. Only 1 case had shown any clinical evidence of diphtheria. The hospital wards were closed for three weeks to the reception of new patients. At present they have reduced the number of positive cultures to 17. A search for the source of the infection seemed to point to a nurse in the baby ward who had suffered from a sore throat. Eight positive cultures were found among 12 babies, and 7 nurses gave positive cultures. This nurse had mingled freely with other nurses throughout the hospital, and they were forced to the conclusion that she was the beginning of the trouble. To prevent the occurrence of such outbreaks they were convinced that all institutions for the care of sick children should be provided with a suitable detention ward for the detention of all new admissions. They felt that new cases should, immediately on admission, have nose and throat cultures taken, and be at once placed in the detention ward for five days. All the ward cases which showed the slightest symptoms of the minor contagions should immediately be placed in the detention ward and carefully watched for a proper period, and if definite symptoms of any contagion appeared they should at once be transferred to the contagious disease institution. If it was impossible for financial reasons to provide a detention building, cubicles should be provided in each ward and proper nursing technic carried out to prevent the dissemination of minor contagions. Nurses, internes or employees showing any evidence of illness should be seen at once by medical officers. Visitors to ward patients should be restricted to adults only, and such visitors admitted as infrequently as possible. Following the suggestion of Dr. Alfred F. Hess, all infants should be kept isolated from children of the run-about age. Tests for the virulence of diphtheria carriers should be made, thus relieving ourselves at once of a large number of cases which it would be otherwise necessary to isolate.

THE SCHICK REACTION IN INFANTS

Dr. Henry L. K. Shaw and Dr. William E. Youland, Jr., said there was no question of the accuracy of this test in detecting individual susceptibility and immunity to diphtheria. Clinical evidence showed that young infants, especially in the first six months of life, possessed natural immunity and that the susceptibility to diphtheria increased rapidly after the first year to the eighth year and then decreased. The results of the Schick test in children over two years of age showed a striking similarity with the clinical frequency of the disease, but the statistics of cases under two years of age were meager in comparison and not at all uniform. A review of the results of the observations of various investigators in cases under one year of age showed a variation of from zero to 40 per cent., and from one to two years of age the variation ranged from 15 to 65 per cent. They had made an investigation among 95 infants under two years of age in 2 infants' institutions and hospitals in Albany. In making the tests they used the standard diphtheria toxin diluted so that 1 c.c. contained one-fifth the M. L. D. and 0.1 c.c. of this dilution was used in making the tests. The procedure of Park and Zingher, of heating one-half of the diluted toxin at 70°C. for three minutes, was used for the purpose of control. The reactions were read daily for four days and the final interpretation made on the fourth day. In practically no case did a typical pseudo reaction occur. In some cases the reaction did not appear until the third day, although it appeared more frequently on the second day. Their results in the different institutions were remarkably constant. In 66 children under one year of age they found 47 per cent. positive, while in 29 children between one and two years of age 58.6 per cent. were positive. These results are remarkably similar to those reported by Park and Zingher. They had one patient in which the Schick reaction was negative who two days later developed diphtheria, as demonstrated by cultures. From their experience with this group of cases it would seem that when virulent diphtheria bacilli were found in infants having no antitoxin in their tissues, a careful examination for diphtheritic rhinitis should be made; they had had 5 cases in which it was entirely overlooked clinically.

There was no question but that every child, nurse, or attendant, entering a children's hospital or institution or coming in contact with the children in any way, should have cultures taken from both nose and throat and a Schick test made as a matter of precaution against the disease.

METABOLISM OF INFANT ON ARTIFICIAL FOOD—Hellesen's (Nordisch. Med. Archiv., Stockholm, February 27, 1915, Vol. XLVIII., p. 784) report of his prolonged research in this line fills 120 pages and is accompanied by thirty-one tables showing the metabolic findings and the conditions in regard to nourishment. The data confirm the view that carbohydrates spare the carbon and the nitrogen reserves better than fat. The research demonstrated beyond question that carbohydrate food has a marked influence on the mineral metabolism, especially of sodium. He declares that there seems to be some mysterious specific action here. Carbohydrates and fats therefore cannot substitute each other indiscriminately. Each has its specific action on the whole metabolism of force and matter, and this is a factor of great importance for their rôle as food. The research was carried out on a healthy five-months babe, of healthy parents and breast-fed till the age of four and one-half months. The work was done at the Auguste-Victoria institution near Berlin, which is fully equipped for all such research, as it is the central headquarters of the welfare work for and study of infants.—*Journal of American Medical Association.*

DEPARTMENT OF ABSTRACTS

ORIGINAL CONDENSATIONS OF CURRENT PEDIATRIC LITERATURE
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VINING, C. WILFRED: AN APPEAL FOR THE MORE EXTENDED USE OF WHOLE MILK IN THE ARTIFICIAL FEEDING OF INFANTS. (The Practitioner, November, 1915, p. 589.)

Vining deplores the apparent lack of a uniform and practical standard of infant feeding applicable among the poorer classes, and states that even for the fortunate the ordinary milk dilution method is complicated and requires skilled supervision. He affirms that citrated whole milk feeding is the method of choice when breast-feeding is impossible, and that experience is not lacking to show that a baby who will not "take" whole citrated milk will not take cow's milk in any reasonable dilution. The amount of sodium citrate added is 2 grains to each ounce of milk until about the sixth month of life, after which the quantity of citrate is reduced one-half. Although a dilution of half and half is usually resorted to during the first three weeks of life, undiluted whole milk is usually given thereafter. The amount allowed at each feeding is in no sense arbitrary, but is regulated to meet the behavior of the child. The argument that whole milk is unsuitable because of the high caseinogen content is met by the statement that the plentiful protein in cow's milk implies no proportionate excess of total solids, because of the relative lack of carbohydrate; and that difficulty in digesting cow's milk disappears when clot formation is prevented. No ill effects are ascribed to the continued ingestion of the citrate of soda. The author contends that whole milk thus prepared is less expensive than diluted whole milk plus sugar and cream, or the dried milks of which Dr. Eric Pritchard is an advocate; and also that from the bacteriological viewpoint citrated whole milk which has been heated is safer than the dried milk preparations.

G. W. G.

Pritchard, Eric: The Citrate Whole-Milk Method in the Feeding of Infants. (The Practitioner, February, 1916, p. 144.)

The author takes as his text the views expressed by Vining in the article above reviewed, and although agreeing that in the main citrated whole milk feeding gives good results, insists that these are not the best, and affirms that the essential conditions of proper infant feeding are independent of any one method. These conditions are:

'(1) That the necessary elements for growth, maintenance, heat-production, energy-production and the elaboration of secretions are supplied in the proportions and in the quantities required in each particular case. (2) That these elements are presented in a form capable of being digested and assimilated, and otherwise suited to the specific physiological make-up of the infant to whom they are supplied. (3) That the food is of such a nature as to exercise and develop the latent digestive capacities preparatory to a more extensive dietary."

Pritchard holds that the proportion of fat, sugar, and protein in human milk is the result of evolutionary adaptation through the ages, and this proportion is physiologically right for the infant's best nutrition. Whether the amino acids necessary for the best nutrition can be obtained equally well from cow's milk proteins is questionable. He believes that in the limited quantity of water is to be discovered the secret of success of the whole milk method, small quantities of food in concentrated form being of special value in cases with deficient gastric motility. So long as infants refuse to conform to a standard Pritchard believes that no effort should be spared to meet special requirements by special methods, and that the citrated whole milk method is unsound because it permits no latitude for such adaptation and the study of the influence of variations. Percentage feeding satisfies physiological requirements. Finally he affirms that "dried milk, if properly modified and of good quality, has all the advantages, and few of the disadvantages, of so-called dairy milk." G. W. G.

Carter, Ronald: The Use of Undiluted Citrated Milk in the Feeding of Infants. (The Practitioner, February, 1916, p. 154.)

Carter reviews his experience of eight years in infant consultations and decides that, although he obtained good results from undiluted citrated milk feeding, the weight curve in cases thus treated typically rising more rapidly than under the diluted milk method, nevertheless his best results were gained by "abandoning all routine methods and concentrating on the individual requirements of each case." The best results from whole milk feeding were obtained in cases of wasting associated with gastric dilatation, vomiting and diarrhea. Dried milks were found to be safer during hot weather. These may frequently be used to advantage in the same manner as cow's milk (diluted or undiluted) in supplementing and conserving breast-feeding. It is interesting to note that in the modification of his diluted milk feedings, in one series at least, Carter made use of a "cream solution" consisting of equal parts of linseed oil and lime-water with varying amounts of cow's milk, water and milk sugar. The views of Pritchard and Carter, while not opposed to the use of citrated whole milk in individual cases, are not in accord with Vining's recommendation that it be adopted as the method of choice. G. W. G.

O'NEIL, R. F.: BLADDER TUMORS IN THE YOUNG. (Boston Medical and Surgical Journal, December 9, 1915, p. 850.)

The author divides bladder tumors into three groups, the first occurring from one to ten and from ten to twenty years, and the second group from twenty to thirty. The third group consists of those occurring from thirty years on.

In the first group the growths are always of the connective tissue type, as sarcoma, fibrosarcoma and myoma, while in the second group all types are met. The first group have a different symptomatology and pathology.

Bladder growths in children and infants are distinctly rare. The literature on the subject is scarce. Concetti gives a general description of the subject, based upon 41 cases, collected from the literature. Steffen also collected 32 cases from the literature in 1915. Since then Hüsler has written on the subject and there have been some case reports. The vast majority of primary growths of the bladder in children are polypoid in type, and should be classed as sarcoma. They are almost uniformly fatal. The tumors always start from the mucous or submucous coats, generally from the trigone, usually multiple, and varying in size. These may have a lobulated appearance, like a bunch of grapes. They recur rapidly after removal, but do not form metastases.

They tend to infiltrate the mucous and submucous coats of the bladder and ureters. As the urethra is usually blocked by them, muscular hypertrophy of the bladder occurs. There is dilatation of the ureter and kidney pelvis with subsequent infection. The first thing noticed is some disturbance of micturition, pain, tenesmus, sudden retention or incontinence. Hematuria is often absent. Vesical tumors in children are very rare. The great majority appear before the fifth year. They are of the connective tissue type, clinically and pathologically malignant, with few exceptions. Difficulties of micturition are generally the earliest symptom and in the absence of stricture should excite suspicion. C. E. F.

MITCHENER, P. H.: SOME NOTES ON FISTULA-IN-ANO, WITH SPECIAL REFERENCE TO ITS PRESENCE IN CHILDREN. (British Journal of Surgery, 1914-15, Vol. II., p. 364.)

Fistula-in-ano is a very rare condition in children. In a period of ten years over 1,500 cases were operated on at St. Thomas's Hospital for fistula-in-ano. Of these only 12 cases were children. In adults this condition is usually a blind fistula, following an ischiorectal abscess occurring from an infection of the peri-rectal fat, owing to inflammation from hemorrhoids. In the cases where complete and multiple fistulæ exist there is always a condition of abdominal or pulmonary tuberculosis. In the cases of the children reported there was a history of tuberculosis in only 3 of the 18 cases. In most of the remainder the fistula was anal in type, with a previous history of an ischiorectal abscess. In 2 cases definite hemorrhoids were present. In one, a baby of eighteen months, the fistulæ were believed to be congenital. All these cases were of male children. No case is reported of an operation for this condition in a female child.

C. E. F.

ERRATUM

Owing to an oversight no mention was made in "A Short History of Infant Feeding," which appeared in the April ARCHIVES, of Bartholomaus Metlinger's book on the care of children, which was published in Augsburg, Germany, in 1473, and preceded the "De Aegritudinibus Infantum" of Paulus Bagellardus by fourteen years. This book is the first on the subject.

BOOK REVIEWS

American Association for Study and Prevention of Infant Mortality. Sixth Annual Meeting, Philadelphia, November 10-12, 1915.

This book, larger and better in every detail than the one preceding, contains full reports of the various committees of the Association, a list of members, various addresses and, lastly, a full report of the sessions held at the meeting. These include papers on Pediatrics, Obstetrics, Economic Aspects of Infant Welfare, Eugenics, Care of Homeless Babies, and Nursing and Social Work. It is a most interesting volume, carefully compiled, and well repays a thorough perusal.

Mortality of Cancer Throughout the World. By Frederick L. Hoffman, LL.D., Statistician of the Prudential Insurance Company of America. Published by the Prudential Press of Newark.

A business-like, convenient-sized volume of 826 pages, including a bibliography of 11 pages and a very complete index.

The author makes a strong plea for the standardization of statistics and for the accurate recording of the actual causes of death.

In chapter three the author discusses the important question of Cancer Increase and arrives at the conclusion that for some of the more important countries of Europe, at least, there is an absolute, as well as a relative, increase in the cancer death rate.

In view of the present widespread interest in industrial hygiene chapter four commands an unusual attention. Especially is this interesting in view of the fact that there is a high cancer rate for the anilin oil employing industries, for, since the development of the conditions arising out of the present European War, there have opened up new fields in which these products are used. It may be noted in this connection that there have recently emanated from the rubber industries some very interesting reports of new forms of irritation and toxic dermatoses which have been definitely traced to the use of anilin oil in industries which prior to this period had not employed this agent. It is hoped that the successful completion of the present study will tempt the author into the development of some other allied field in the department of hygiene.

ARCHIVES OF PEDIATRICS

JUNE, 1916

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ORIGINAL COMMUNICATIONS

ACCIDENTS AND DISEASES OF THE EARLY WEEKS *

BY L. E. LA FÉTRA, M.D.

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Injury to the infant is the result of prolonged labor, especially dry labor, difficult forceps extraction, abnormal presentations, and difficult extraction of the aftercoming head. Injury results also from compression of the umbilical cord, particularly when the cord is tight around the neck. It is to be emphasized that the forceps are less a cause of injury than failure to use them early in a case of difficult labor.

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* Read as part of a Symposium on "The Care of the Newborn Infant" from the obstetric and pediatric standpoints, at the New York Academy of Medicine, Sections on Obstetrics and Pediatrics, March 28, 1916.

The injuries may be grouped as affecting the head, the neck and the extremities. On the head there may be cephalhematoma, which is to be distinguished from fracture by its limitation to the confines of the separate cranial bones and by the floor of the swelling being on the same level with the rest of the skull.

Fracture of the cranial bones is not frequent, is practically always depressed and is frequently accompanied by signs of intracranial hemorrhage. The elevation of the depressed bone can be accomplished most successfully by the use of the strong hook devised by Dr. Kosmak, the present Chairman of the Obstetrical Section.

Facial palsy from pressure on the facial nerve by the forceps is usually only temporary, and is not of serious import.

The serious injuries to the head are those that result in intracranial hemorrhage—either meningeal or cerebral. These result from tearing away of the attachments of the dura enclosing the cerebral sinuses, in which case the blood is effused into the pia and spreads out on the surface of the brain; or may pass into the ventricles; again, the hemorrhage may result from the rupture of small arteries in the meninges or brain.

Frequently there are no immediate symptoms if the hemorrhages are small; in other cases there is merely a slowing of the pulse and irregularity of respiration, together with slight spasms of the face and extremities. Only when the hemorrhage is extensive are there symptoms of intracranial pressure, such as irregularity of pulse and respiration, inability to nurse and convulsions, followed by spastic paralysis. The loss of the sucking reflex is a most important sign of serious brain lesion. Absence of pulsation in the fontanel is commonly present.

Localization of the site of the hemorrhage is often not possible, since the symptoms are general. Lumbar puncture may show bloody cerebrospinal fluid.

The commonest result after recovery from brain hemorrhage is spastic paralysis of one side of the body or of both lower extremities. When more than two extremities are involved there is nearly always mental impairment. Immediate operation should be done if the hemorrhage can be localized.

Injuries to the Neck—Rupture of the sternomastoid muscle is shown by a hard swelling in the belly of the muscle near the clavicle and at times by wry neck.

Rupture of the cords of the brachial plexus occurs when pressure or traction is put upon the neck with the head rotated. This results in brachial paralysis, with flaccid shoulder and inverted hand hanging limp by the side. Contractures develop later and may produce subluxation of the shoulder joint. Dr. Alfred Taylor has had good results from operating on some of these bad cases.

Fractures of the humerus and of the femur are most apt to occur in abnormal presentations or relatively large infants. Treatment is very satisfactory, even when the infant has multiple fractures.

Of the *diseases* and *disorders* to which the newborn infant is subject, among the congenital defects the most important is congenital heart disease. Congenital hypertrophic stenosis of the pylorus is also important. Both of these will be discussed later.

Spina bifida, with or without meningocele, adds gravity to the prognosis in proportion to its size and accompanying conditions. Cleft palate and harelip may also add to the difficulty, not only of feeding, but of keeping the mouth clean and preventing respiratory complications. Another defect is club-foot.

Constitutional disease is shown especially in hereditary syphilis—a topic to be discussed by another speaker—and also by sclerema and general debility, chondrodystrophy and mongolism. Cretinism is not evident during the early weeks.

Among the acquired diseases, most important in the early days are the acute infections. These include gonococcus ophthalmia and vaginitis, the former of which would be entirely prevented if physicians were as careful about instilling nitrate of silver as all midwives are required by law to be, under penalty of losing their licenses.

Erysipelas is not frequent, but is peculiarly fatal in young babies. Tetanus is formidable, but much less so, since its antitoxin is used intraspinously.

Of recent years sepsis in the newborn has become an important chapter of our increasing knowledge of infantile diseases. Sepsis in infants may be caused by a great variety of germs, most frequently the pyogenic cocci, the diplococcus of pneumonia, the colon bacillus, the bacillus pyocyaneus, the influenza bacillus and the bacillus of Friedlander.

In rare instances the infant may be born septic, or may become infected through aspiration of infected liquor amnii. The umbilical cord is the most frequent entrance port for sepsis; and next in frequency is the skin. The mucous membrane of the gastrointestinal tract is frequently the port of entrance; intestinal streptococci or other germs passing through the membrane abraded as a result of intestinal irritation.

Susceptibility to Sepsis—Because of the undeveloped condition of the skin and mucous membrane, the newly born are exceedingly susceptible to septic infection; moreover, the blood vessels are very friable, so that merely a great increase in blood pressure may suffice to induce hemorrhage. This fragility is increased if there is toxemia or infection. The younger the child, the less the resistance, so that the premature infant is most easily attacked. Moreover, infants in institutions are far more apt to become septic. Young infants have a very low degree of protective power, which is partly attributed to the undeveloped condition of the lymph nodes of the skin and of the gastrointestinal tract. It is even said that the intestinal mucous membrane is pervious to bacteria without any lesion. According to Halban and Landsteiner, the susceptibility of the young infant to septic infection is largely due to its insufficient capacity for manufacturing protective substances. Breast-fed infants are attacked much less often than those who are artificially-fed, and Moro explains this on the basis of the transmission to the baby of alexins through the mother's milk. There is advanced also a theory that the cells of the artificially-fed children are so taxed by the assimilation of the foreign proteins that they can elaborate less protective substance against possible infection.

Symptoms of Sepsis—Sepsis in the newborn occurs in many forms. Some cases run their course without symptoms or with only a little fever. Others show signs of acute gastrointestinal diseases or of pneumonia, especially bronchopneumonia. Other patients show the picture of meningitis, and still others are cases of hemorrhagic disease, with or without a combination of the meningeal pulmonary or intestinal symptoms. Occasionally sepsis affects the joints, the bones, or the tissues near the joints.

Treatment of Sepsis—Prophylactic measures are the best. After the condition has arisen, in addition to proper feeding, airing and nursing, all the avenues of elimination should be encouraged. Vaccines can hardly be expected to do any good, considering that the system is already deluged with bacteria. Antisera have not hitherto proved satisfactory, but much may be hoped from their further development. The most promising treatment is either transfusion or the injection of normal blood or serum. To encourage one in making a trial of the serum injections, Welch reports 4 cases of streptococcus septicemia in puerperal women. All of the cases were regarded as hopeless, but two of them made striking recoveries.

In order better to emphasize the clinical significance of some of the injuries and diseases already mentioned, I have chosen certain symptoms for fuller discussion, namely, cyanosis, convulsions, hemorrhage and vomiting.

CYANOSIS—Cyanosis may exist from birth and may be constant, with or without exacerbations, or it may occur a few hours or days after birth and be intermittent.

Congenital Heart Disease—The blue baby of congenital heart disease is usually cyanotic from birth. There are all grades of cyanosis, depending upon the severity of the heart lesion, but the blueness is constant. Examination of the chest will commonly reveal a loud systolic murmur over the base of the heart, but there are not infrequently cases of cyanosis from congenital heart disease without any murmur being discoverable. In all these cyanotic cases, however, there is a great increase in the hemoglobin and in the number of the red cells.

Atelectasis—The feeble infant suffering from atelectasis is somewhat cyanotic all the while, but has spells of being more blue than usual.

Cyanosis in attacks comes most frequently in the premature or congenitally feeble infant, as also in those that have been asphyxiated at the time of birth.

Asphyxia—Cyanosis from simple asphyxia during birth, and due to intrapartum respiration, is frequently accompanied by the secretion of a large quantity of mucus in the bronchi and upper air passages, which may be so profuse as to require being aspirated or blown out.

Indigestion in young infants is often the cause of cyanosis, as well as of the more dramatic symptoms of convulsions. Rich breast milk or an unsuitable milk modification may be the occasion of the indigestion. Distention of the abdomen and the absorption of the toxic substance from the intestinal tract are responsible for the attacks. On the other hand, lack of food also may result in cyanosis from inanition; this is especially the case with premature infants who are too weak to draw the milk from the breast or even from the nursing bottle. Several times I have found that such babies were getting, when nursed, less than 2 drams of breast milk. The attacks of cyanosis disappeared when the breast milk was fed to the baby by gavage or by means of a Breck feeder.

Intracranial hemorrhage is, of course, next to congenital heart defect, the most serious cause of cyanosis. With such a condition, the cyanosis occurs in attacks and is accompanied by irregular or shallow respiration, often by a shrill cry and by convulsions. Furthermore, septic conditions in other parts of the body may be the cause of the cyanosis.

Finally, a rare type of cyanosis is that which may occur as the result of giving bismuth subnitrate for diarrhea. In these cases there is a nitrate poisoning.

The treatment of cyanosis must be, if possible, in accordance with its etiology. Besides, as general prophylactic measures, feeble and premature infants must be kept warm in a well-ventilated incubator room, preferably with means provided for moistening the air. They must be properly fed with a sufficient quantity of breast milk or suitable milk modification, and this should be given by gavage if necessary. The bowels must be kept open and, if there are attacks of cyanosis, the respiratory center must be stimulated at stated intervals by spanking or by hot and cold baths. It may be necessary to administer oxygen at intervals for twenty-four or forty-eight hours.

Convulsions—Convulsions, mild or severe, are very closely related to cyanosis and occur in many of the same conditions. In the first place, simple asphyxia from prolonged labor may cause convulsions, probably due to carbon dioxide poisoning. These convulsions cease after a few hours, unless they are due to intracranial injury. In the second place, convulsions may occur from gastrointestinal autointoxication. In the third place, convulsions may occur from what would appear to be an edema of the brain or its meninges. Although I have no anatomical proof of this condition, I believe that it occurs, holding a position midway between the severe edema of the scalp shown in caput sucedaneum or cephalhematoma and meningeal hemorrhage. In the fourth place, convulsions may occur from intracranial hemorrhage due to birth injury. In such cases there is generally no pulsation of the tense or bulging fontanel. Lumbar puncture may show either blood or bloody fluid, though this is not always the case if the hemorrhage is entirely cerebral. There are present, also, the usual signs of intracranial pressure, such as irregular respiration, increased knee-jerks, and spastic paralysis of the extremities.

As to treatment, the question of operation has to be considered. If one can be sure of the location of the hemorrhage and sure that it is traumatic, there is much encouragement in the results reported by Cushing, but great caution should be exercised in the determination of the diagnosis. Some years ago a baby, that afterward came under my charge, had convulsions, which appeared on the sixth day; these were thought by the attending physician to be due to intracranial hemorrhage, and operation was urged; but a thorough evacuation of the bowels, together with the dilution of the rich breast milk, was followed by cessation of the convulsions.

Convulsions may arise from intracranial hemorrhage due, not to birth injury, but to sepsis. It is, of course, difficult to separate the two causes, but in the cases due to sepsis, the symptoms come on several days, or even weeks, after birth instead of at once. Frequently the obstetrical history is of help as showing the probable presence or absence of intracranial pressure. In its absence and with convulsions that appear several days after birth, the intracranial hemorrhage is more likely to be due to sepsis than to trauma. The signs are those of a gradually increasing intracranial pressure. The fontanel becomes tense, later is bulging and loses its pulsation. Lumbar puncture may reveal a bloody fluid. There may or may not be fever and there may be hemorrhages elsewhere.

HEMORRHAGES: *Hemorrhage in the Newly Born*—Bleeding may take place in the newly born from the umbilical cord, from slight wounds or abrasions, from mucous surfaces, especially the stomach and intestines, in which case the disorder is known as melena, or the hemorrhages may appear under the skin as small or large hematomata, or there may be bleeding into the peritoneal cavity or the abdominal viscera. The liver and suprarenal capsule are frequent sites, as are also the lungs and pleura.

These hemorrhages in the newly born are due usually to congenital syphilis or to sepsis. Formerly most of the hemorrhages of early infancy were attributed to hemophilia, but as the knowledge of these blood conditions has increased it is found that the causes due to true hemophilia become fewer and fewer; for it is rare for this condition to show itself under one year. By far the greatest number of hemorrhages that are not traumatic are due to sepsis, so that melena neonatorum and the hemorrhagic disease of the newly born are to be explained nearly always upon the basis of a sceptic infection, the hemorrhage being due either to the germs or to their toxins. The analogy with syphilis is very striking.

The hemorrhagic disease or sepsis with hemorrhage may take on various types, the commonest form being the bleeding from mucous surfaces. There is oozing of blood from the lips or vomiting of dark blood, or the passage of tarry stools. These are the ordinary cases of melena. Unless the hemorrhage ceases spontaneously or is checked by treatment, the infants die within a very few days. The same may be said of the hemorrhages that occur from the skin or mucous surfaces in cases of syphilis, though the course of the disease is somewhat longer.

The modern treatment of both hemophilia and the hemorrhagic disease is the injection of human blood or blood serum obtained from some member of the patient's family. In hemophilia, Broca used with success injections of serum every three months. Whatever the exact cause of the bleeding, it is found that the addition of blood from human beings or from certain lower animals will add the element which promotes satisfactory clotting. Normal horse serum, or, if this is not available, diphtheria antitoxin, has been satisfactorily used in many cases.

The use of the whole blood is more convenient and can be employed with less loss of time, according to the suggestion of Dr. Oscar M. Schloss. Of the whole blood, Schloss used from 10 to 30 c.c. subcutaneously every four to eight hours as long as the hemorrhage continued. He has not had any bad results. At Bellevue Hospital I have had excellent success with use of blood or blood serum in several cases, not only of hemorrhagic disease, but of general debility and sepsis.

The modern treatment for hemorrhages when due to syphilis is the injection of salvarsan or neosalvarsan intravenously, together with the use of mercurial inunctions and combined with the injections of blood or blood serum. Many a life is now saved by these procedures which formerly would surely have been lost.

Vomiting—Occasional vomiting is met with in all infants, whether they are nursed or bottle-fed. This is usually due to too long or too rapid nursing or to taking too much from the bottle, or to a milk too rich in fat or sugar.

But there is another kind of vomiting that comes on in the early weeks of life which is persistent and not controlled by any simple measures. It is peculiar in occurring very frequently in nursing infants. Beginning when the baby is two or three weeks old, it at first appears like ordinary vomiting, but gradually the type changes, becoming more and more forcible until the vomitus is projected in a stream over the edge of the crib. It may come on in the midst of nursing, though not at every feeding. Frequently the baby will not vomit for two or three feedings and then a large quantity will be forcibly ejected, sufficient in amount to equal what had been taken at the preceding two or three nursings. Change of regime or modification of the formula has very little effect. Even stomach washing does not control the difficulty, though it nearly always lessens the frequency of the attacks.

There is constipation, the stools being very small, and later stages consist simply of brownish or dark greenish mucus like the meconium stools of the newborn baby. Meantime the baby loses weight, becomes emaciated, and, finally, presents the picture of marasmus.

Examination of the abdomen reveals peristaltic waves passing across the epigastrium usually from left to right. These are more apt to occur shortly after food has been taken. The appearance has been well compared to that of a golf ball rolling across under the abdominal wall. At times the waves are doubled, giving the appearance of an hour glass, and occasionally their direction is reversed. Palpation in cases where the liver is not enlarged reveals a hard mass at the pyloric end of the stomach, feeling much like a spool or an olive under the abdominal wall. The peristaltic waves of the stomach can also be felt. Percussion reveals frequently enlargement of the stomach, its lower border extending a variable distance toward the umbilicus.

Diagnosis—The important signs for diagnosis of pyloric stenosis are: (1) Projectile vomiting without evidences of indigestion; (2) visible peristalsis; (3) palpable pylorus. In addition to these symptoms, obstinate constipation and the finding of food remains in the dilated stomach several hours after the feedings are important. The X-ray, after a bismuth meal, may show the stenosis most beautifully. As regards the diagnosis between hypertrophy and pylorospasm, it would seem at the present time to be impossible to determine at the outset which condition is present.

Differential Diagnosis—Pyloric stenosis must be distinguished from gastric indigestion with severe vomiting. The important signs indicating stenosis are the absence of bile from the vomited matter, and palpable pylorus. In rare instances pyloric stenosis might be confounded with congenital atresia of the pylorus or congenital stenosis or atresia of the duodenum. I have had one case in which the duodeum was compressed by a band—in this instance there was always bile in the vomited material.

Prognosis—The prognosis of pyloric stenosis varies with the time of onset and with the severity of the symptoms; the later the vomiting begins, the better the prognosis, as a rule. Inasmuch as all grades of stenosis may be present, and since even with hypertrophy there may be varying grades of spasm, the ultimate outcome of any particular case must depend upon the success of the various medical dietetic and surgical measures.

Treatment: Medical—Since in any given case it is impossible to know at the outset whether one is dealing with a case of hypertrophy combined with spasm or a case of spasm alone, the aim of conservative treatment must be to prevent all irritation of the pyloric end of the stomach by food remains or by the acrid products of gastric indigestion. Moreover, in addition to these dietetic measures, treatment should be directed to removing acid mucus, to rendering the pylorus less sensitive and to relaxing whatever spasm may be present.

Surgical Treatment—To relieve the obstruction various procedures have been employed, mostly gastroenterostomy and, latterly, the simple division of the constricting muscle, according to the method of Rammstedt. Dr. Wm. A. Downes, who has had perhaps the most extensive experience in these cases, reports that of 77 cases on which he operated, gastroenterostomy was done in 31, with a mortality of 11, or 35 per cent.; while in 46 cases the Rammstedt method was used with a mortality of 11, or 24 per cent.

My personal experience with this condition comprises 18 cases. They can be divided into two groups: First, those in which the spasm was the prominent feature, and, second, those that had spasm and hypertrophy in which the hypertrophy either was or became the most important factor. Of the cases of spasm alone or spasm with some hypertrophy there were 10 patients. All of these except 1 recovered and without operation. In 2 of them operation was advised by other consultants because of marked peristaltic waves, and the hard spool representing the pylorus. Five years have elapsed with one of these and four years with the other and the children are in perfect health. The one patient that died had severe spasm with marked peristaltic waves but no tumor. Necropsy showed a normal pylorus.

Of the cases in which hypertrophy was the prominent feature, I have had 6; 7 of these were operated on and 6 died. The other case not operated on died while the surgeon was deciding whether the case needed operation. It must be added, however, that 3 of these cases were operated at a time when the technique of the operation was new and not so well understood as at present. I should consider that operation is absolutely indicated as the only hope of recovery in all cases in which hypertrophy is the prominent feature.

As regards diagnosis of the condition of stenosis, peristaltic waves are generally pathognomonic. There are, however, exceptions to this; for the most marked peristalsis of the stomach I have ever seen occurred in an infant eleven months old, who was a Mongol. The mother had noticed a peculiar swelling in the upper part of the abdomen whenever the child was given a bath. In this infant the hour-glass wave crossing the stomach was very prominent, the stomach wall was thick and could be picked up with the fingers, and even the artery at the greater curvature of the stomach could be felt pulsating. The infant did not vomit and never had vomited any more than a healthy baby does occasionally.

The presence of the spool at the pyloric end of the stomach is, of course, diagnostic of pyloric stenosis. It does not, however, necessarily mean hypertrophy, and particularly it does not indicate that operation is necessary. All but two of my spasm cases had the spool very well marked and yet they recovered by medical measures. To my mind the most important indications for operation are two, viz., progressive loss in weight, together with the absence of any food residue in the stools. So long as one sees evidences of food passing into the intestine he may use medical measures, unless the general condition of the child is failing. It should be remembered that after a gradual loss of an ounce or two a day for several days the infant may suddenly go into a bad collapse, so that a slight indication of a change for the worse in the general condition must be seriously regarded.

The after care of operated cases is of extreme importance, for it is a common experience to have such patients do well for three or four days and then to die of exhaustion or respiratory failure even after there has been no vomiting and after good stools have been passed. Careful feeding, extreme quiet and the employment of the Murphy drip are very important.

115 East Sixty-first Street.

Differences in Digestion in Adults and Infants—In the study of J. F. McClendon (Journal of American Medical Association, 1915, Vol. LXV., p. 12) the acidity of the stomach and reaction of the duodenal contents was measured by means of hydrogen electrodes. Indicator papers were calibrated so that clinicians may determine hydrogen ion concentrations approximately. After a normal meal the acidity of the adult stomach reaches its maximum in from two to three hours, the rise in acidity being more rapid the lighter the meal. The height to which the acidity rises varies with the individual, the highest observed in a normal individual being 0.1 normal (about 0.4 per cent. of pure hydrochloric acid). The hydrogen ion concentration of the duodenal contents is 0.00000002 normal. This is slightly alkaline, since that of pure water is 0.00000011 at 25°C. (77°F.). The acidity of the infant's stomach rises slowly after the milk begins to leave it, and four hours after nursing may be the same as some normal adult stomachs. That of the gastric juice of the newborn is 0.005. The acidity of the duodenal contents of the infant is 0.0008. Pepsin was always found and was apparently more abundant (active) than the trypsin.—*The American Journal of Obstetrics.*

CARE AND FEEDING DURING THE FIRST MONTH *

BY GODFREY R. PISEK, M.D.
New York

The first month of the infant's life it will be conceded is a most important one from the standpoint of care and feeding. The latest available mortality statistics for the first month of life in greater New York show that, for the first eleven weeks of 1916, the deaths under one month were 1,199, against deaths under one year of 2,787; in other words, almost 50 per cent. of the deaths occurred in the first month of life. In spite of marked decreases in the infantile mortality, the first month of life is still woefully too high and can be lowered only by active measures of prevention and correction.

In this symposium, and for this audience, I do not feel called upon to go into details of feeding, but I do wish to bring to your attention certain basic principles that underlie the feeding of infants in the first weeks of life, which, if transgressed, are apt to bring trouble or even disaster.

The attitude of pediatrists has changed considerably in the last five years in the artificial feeding of infants. However, there is a unanimity of opinion that breast milk is the infant's birthright and that it should not be denied the infant. In spite of the well-known fact that babies thrive so much better on breast than on cow's milk, that 85 per cent. of all infantile deaths are those artificially-fed, they are still removed from the mother's breast for insufficient reasons by the physician or nurse.

The modern mother is usually willing, although often unable, to nurse her offspring. She is not ignorant of the greater advantages of breast feeding and is, in the majority of instances, eager to co-operate in preserving the supply. By the addition of one, or at most two, bottles a day, the supply can be kept up, at the same time allowing a period of freedom for the mother. In going over my private case book, I find that 30 per cent. of the babies received their mother's breast milk only, 48.8 per cent. were on the bottle and the breast, and 22.5 per cent. were receiving the bottle exclusively. While I realize that these figures will vary in different parts of the country and in

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* Read as part of a Symposium on "The Care of the Newborn Infant" from the obstetric and pediatric standpoints, at the New York Academy of Medicine, Sections on Obstetrics and Pediatrics, March 28, 1916.

different sections of the city, they show that breast feeding is on the increase among those who have been accused of shirking their responsibilities.

Blameworthy are those who remove the baby from the breast not because of the accepted contraindications for nursing, but basing their decision on the fact that no milk has appeared in forty-eight or seventy-two hours, or on one hasty or inaccurate examination of the milk, or because there is some vomiting after nursing, or because of an occasional abnormal stool, or because the mother or attendants *think* the breast milk does not agree. Every effort should be made to enable the baby to have the breast alone, or at least part breast feeding during this first month of life, for, while it will apparently do well for ten days or two weeks on a formula, its resistance then breaks down and its digestion becomes sadly disturbed and is hard to correct. We see babies to whom obstetricians have given a formula do well, while some breast milk is also supplied, but they are only too frequently deranged when the breast secretion ceases and the formula alone is supplied. In other words, even a small amount of breast milk aids in the digestion of the cow's milk. Complete emptying of the breasts is the best method of ensuring a good supply, and yet this simple means is frequently overlooked.

If artificial food must also be supplied it should not be in the form of rich top milk mixtures, but rather a weak formula, low in fats and proteins, although high in sugar. Only after there is a certainty that the infant has adapted itself to cow's milk should the strength be increased in the other elements.

The healthy, newborn infant can be trained to take the breast at four-hour intervals. I say trained advisedly, for it is not a natural interval, the three-hour interval being more preferable; and unless that infant is healthy and vigorous he is apt to fail shortly and need, in addition, artificial food. Weighing before and after a nursing throughout at least one whole day is essential in questionable cases to determine just how many ounces he is receiving. Our experiments with the X-rays on infants' stomachs proved conclusively that babies can take an amount far in excess of their rated gastric capacity, because the milk tended to pass at once into the duodenum.

Mixed feeding should not be introduced in the first month if at all avoidable. Greater resistance is secured after a month or two on the breast alone, and this plan will not prevent the baby becoming accustomed to a bottle and thus affording relief to the mother in the months to come. More than two bottles given per day is likely to diminish rather than augment a failing supply, because the breasts will not be thoroughly emptied. If it has been satisfactorily determined that the amount of secretion is constantly deficient, then a bottle feeding should follow each nursing period.

The care of the pathological newly born would extend to beyond the limits of the allotted time, but one can sum up by saying that here particularly unsuccessful efforts at artificial feeding should be at once discontinued and, if necessary, the help of a wet nurse be secured.

Should the circumstances demand that artificial feeding be given a baby in its first weeks of life, the physician must realize the importance of the problem; that he is feeding in the most sensitive and precarious period in the baby's existence, that one mistake may endanger the child's life, whether this be in the food itself, the mixture, or in its preparation.

We are constantly seeing babies for whom the fats have been steadily increased to augment the weight or to obviate constipation. Simplicity in feedings is happily gaining ground, and if we keep in mind the caloric needs, the protein needs, and can at the same time adapt the food to the digestive capacity of the particular infant being fed, we have success quite assured.

The newborn should not be given such an amount of food as would produce a gain in weight; in other words, the caloric requirements are not to be fulfilled until the end of the second week is reached. His digestion would not tolerate such a food. It must be poor in proteins and fats and contain a readily assimilable sugar, which is increased gradually until at least an ounce is given in the day's feeding. Boiling the milk in these first weeks is often necessary to prevent the formation of tough curds, for we find clinically that digestion is promoted thereby.

We need not discuss here the relative value of raw and pasteurized milk. We are agreed that the cleanest and most wholesome milk obtainable is *the* milk for infant feeding. The treatment such a milk receives will depend upon the necessity for preserving it, or its modification, by a degree of heat which will so alter its properties as to meet the demand of the individual infant.

We may expect a gain in weight only when we have given the food in a utilizable form and in such quantity that the caloric needs (100 to 120 calories per kilogram of body weight) have been supplied. The amount of food allowed will depend on the period selected and should be calculated on a twenty-four hour basis; 10 to 12 ounces will be taken by a baby in its first week; 12 to 16 ounces in its second and third week; and 20 ounces when a month old.

Just a word in relation to the proprietary foods; many physicians, realizing the difficulties of feeding the baby in the early weeks, resort to the various milk preparations. These are often seemingly successful, particularly when of the carbohydrate variety, because of the large amount of dextri-maltose contained, or because of the colloidal action of their ingredients on the milk.

Giving an infant some sort of food that will be retained and cause a gain in weight is not necessarily good infant feeding. Because it has not caused indigestion, such substitute or temporary foods are continued throughout infancy or until developmental damage shows itself. The food must contain enough proteids and mineral matter to repair waste and produce new tissue, and enough fats and carbohydrates to supply energy.

At no time is it as necessary to inculcate regularity of habits and to abide by the laws of hygiene as in this first month of the baby's life.

Obstetrician and pediatrist must join hands in this care, for on them devolves in a large measure the responsibility of reducing the mortality of the newly born.

36 East Sixty-second Street.

SOME PROBLEMS CONNECTED WITH THE OUT-PATIENT TREATMENT OF CHILDREN WITH HEART DISEASE—Clara M. Welsh (Boston Medical and Surgical Journal, 1915, Vol. CLXXIII., p. 352) starts with the idea that "heart disease is a social disease and needs social treatment," and she writes of her four years' experience as a social worker among 264 children afflicted with heart disease. Evidently for strict rest in bed to be undertaken at the child's home, the visitor will have many difficulties to encounter with "unbelieving parents." Nevertheless, she is of opinion that where home treatment can be really properly carried out, it is superior to convalescent home treatment.—*The British Journal of Children's Diseases.*

CHLOROMA *†

A Report of Two Cases, Together With the Roentgenologic Findings

BY EVERETT W. GOULD, M.D.,
AND
LEON THEODORE LE WALD, M.D.
New York

Although this disease has been described since the beginning of the nineteenth century under the names of chloroma, chlorolymphoma, and green cancer, only a comparatively few cases have been reported, and its apparent rarity seems to make it advisable to record the following 2 cases which have appeared in the Pediatric Service of St. Luke's Hospital.

The most complete description of the disease is given by Dock and Warthin in their excellent report of a case and review of the literature upon this subject. It seems to be fairly well proved by them that the condition arises from a hyperplasia of the parent cells of the leukocytes, especially in the red marrow of the bones, that it also occurs in any of the leukoblastic tissues of the body, and that we, therefore, find neoplasm-like formations in the spleen, liver, lymphatic glands, and, in fact, in almost all the tissues of the body.

Their analysis of the cases which have been reported would tend to show that it much more frequently occurs in children and particularly in males. One of our cases was a girl three and a half years old; the other a boy, five years old.

The chief clinical features which characterize the disease are an exophthalmos, which is produced by a retrobulbar lymphoma; swellings of the temporal and occipital regions, due to the involvement of the cranial bones; enlargement of the spleen and lymphatic glands throughout the body, especially of the cervical region; and a severe and progressive anemia causing weakness, fever and emaciation.

Nearly all cases have shown an involvement of the bones of the skull, and it is this feature which gives rise to some of the most characteristic signs and symptoms of the disease. This

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* From the Pediatric Service and the Roentgen Ray Department, St. Luke's Hospital, New York.

† Read at the New York Academy of Medicine, Section on Pediatrics, February 10, 1916.

hyperplasia undoubtedly begins in the marrow of the cranial bones, but soon involves the periosteum and the dura mater, forces the sutures apart, fills up various foramina of the skull, and by pressure upon nerves which emerge from the brain through these openings may cause blindness, deafness, pain or other symptoms referable to the nerves involved.

Thus the exophthalmos, which is such a prominent symptom, is undoubtedly due to the growth within the orbit of a mass of leukoblastic tissue which originates in the marrow of the adjacent cranial bones and by rapid proliferation forces its way through the foramina or the periosteum itself and presses upon the optic nerve and bulbus oculi. Heyden states that exophthalmos was the first symptom noted in a majority of the 14 cases which he reviewed. It was also an early symptom in most of Dock's cases. In some reported cases there has been no exophthalmos.

The involvement of the other cranial bones causes swellings which may be so rapid in development and so soft that they simulate a cystic condition. The pain and swelling in various joints of the body, which have been frequently described and which have led to an early diagnosis of rheumatism in several instances, have been proved by postmortem examination to be due to this same hyperplasia of the marrow cells in the adjacent long bones. In various reports nearly all the bones of the body have been cited as being the seat of this change, and, although postmortem examination was not made in either of our cases, nevertheless the Roentgen ray findings would seem to indicate that the involvement was both general and characteristic.

The blood picture of chloroma varies greatly in the reported cases. The anemia, which is so marked and so progressive, causing early weakness and emaciation, is believed to be due to the rapid proliferation in the bone marrow of the leukoblastic tissues, resulting in the crowding out of the elements from which the red blood cells are derived. The anemia therefore depends upon the deficient production of red cells rather than upon any toxic destruction of them. The hyperplasia of the leukoblastic elements leads to the frequent appearance in the blood stream of large numbers of white blood cells of various types, and has led to its classification as a form of leukemia. In most of the reported cases this characteristic leukemic picture has been found at some time during the course of the disease, especially during the later stages. The predominating type may be any one of the normal or leukemic types of the leukocytes, depending upon the stage of proliferation; or, as Dock has suggested, the hyperplasia of the parent cells may reach such a stage that the new forms do not reach the blood stream in such numbers as to give the picture of a leukemia. An aleukemic chloroma is therefore possible. During the time that our cases were under observation the blood picture was never that of a leukemia. Frequent examinations were made, but the time during which the blood was carefully watched represented only a small part of the duration of the disease.

The name chloroma was given to the disease on account of the peculiar green color which was frequently seen when the tumors were removed from the body, or seen postmortem. This green color may be found in any of the new growths, or even in a blood clot within the heart, but is a more prominent characteristic of the hyperplasias of the bone marrow. The nature of this coloring matter is still unknown. Observers differ widely in their descriptions of its characteristics. Most of them state that it fades rapidly when exposed to the air, but the color has been seen to grow deeper when exposed. That it is due to broken-down blood pigment is suggested by some. Dock believes that it is probably a parenchymatous color and that it is possible that processes morphologically like chloroma may lack the characteristic green color. Such cases should be classed with the nonchloromatous leukemias.

In regard to the histologic characteristics of this disease some very important observations have recently been made by pathologists to show that it does not belong to the lymphomata, sarcomata, or lymphosarcomata. Rosenblath urged the rejection of its classification with the lymphomata because so many of the tumors which might, from their green appearance, be considered as such, differ essentially in many of their characteristics. They have no capsule, but grow rapidly and diffusely through muscles, fat and bone.

Guembel emphasizes the difference between chloroma and sarcoma. He points out the fact that it is impossible to find the primary growth, that there is an absence of giant cells, that there is no bone formation, and that circumscribed metastases in internal organs are wanting.

That the tumors of chloroma are composed largely of cells of leukoblastic origin was perhaps first observed by Klein and Steinhaus, who found that neutrophile cells, especially myelocytes, constituted a large part of the tumor mass. Large and small lymphocytes with eosinophile granules were frequently predominant, and they, therefore, classified the disease with the leukemias.

The thorough microscopic examination of Warthin would show that in his case at least the tumors which involved the vertebræ and the prevertebral tissues were primary in the bone marrow spaces, that they infiltrate or grow through the lymphatics and blood vessels or break through the bone and secondarily involve the periosteum and surrounding tissues. Section shows that the normal marrow tissues are almost entirely replaced by cells of the large lymphocyte type, most of them showing eosinophile granulation. Transition forms of various kinds are numerous, but the whole vertebral tumor is made up principally of cells of leukoblastic origin with a scanty and delicate tissue reticulum, and with little evidence of new blood-vessel formation. Nodules of similar histologic structure were found in various organs of the body arising from intravascular proliferation and seeming to have little influence upon the surrounding tissues except by pressure and atrophy. There is little manifestation by the organ involved of a reaction in the nature of a resisting proliferation of the tissue cells, or the development of a reticulum and blood vessels.

The Roentgen ray findings in the 2 cases of chloroma studied appear to be fairly characteristic, especially in regard to the proliferation of bone tissue in the skull producing a separation of the suture lines. (Figs. 1 and 2.)

In the second case studied there are characteristic changes in the long bones. The process appears to be essentially a rarefaction and proliferation in the medullary cavities over a variable distance from the surface of the shaft. (Figs. 3 and 4.) The absence of epiphyseal changes distinguishes the condition from infantile scorbutus and rachitis. The combination of the periosteal changes with the changes in the medullary cavity distinguishes the condition from a myelomatous lesion. The extent of the process distinguishes the condition from sarcoma. The changes in the medullary portion of the bone appear to be distinctly different from syphilis.

Our findings are exactly in accord with the gross pathologic changes described by Warthin. As far as we have been able to ascertain these are the first cases in which the Roentgen ray findings have been recorded.

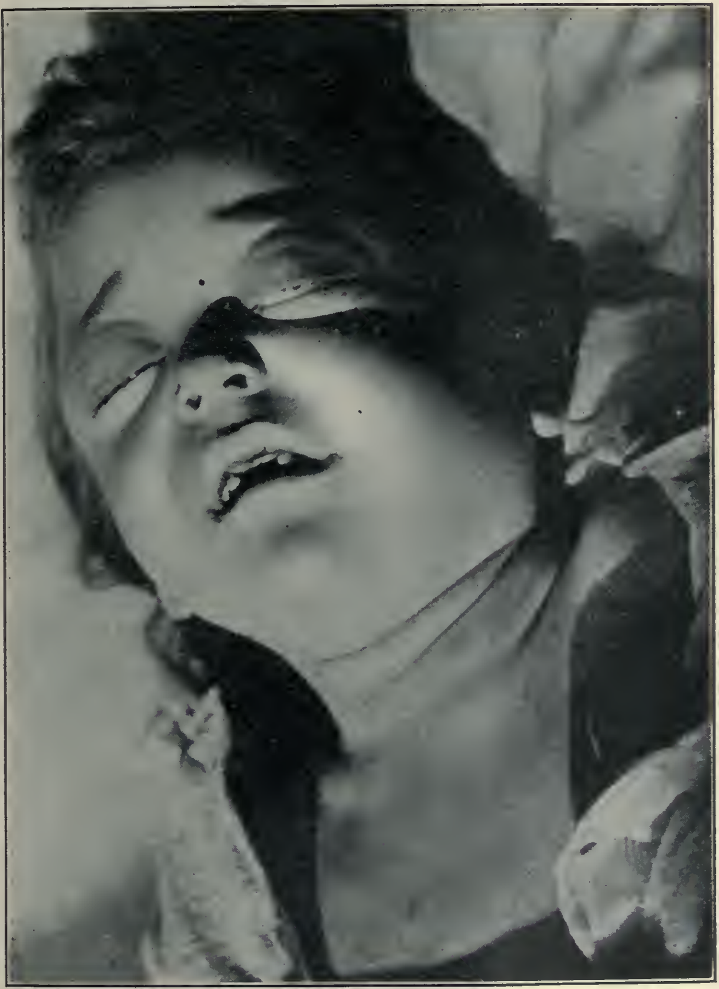

FIG. 1—Case 1. S. R., Female, aged 3½ years. Note exophthalmos

CASE No. 92,962. S. R., girl three and one-half years. Admitted to hospital January 27, 1913. American, born of French parents. Family history negative. Was a full-term child, normal labor, nursed nine months. Had pertussis eight months before admission. Two months later had pain in right side of abdomen and chest. No pathologic cause determined at Babies' Hospital, where patient was treated at that time.

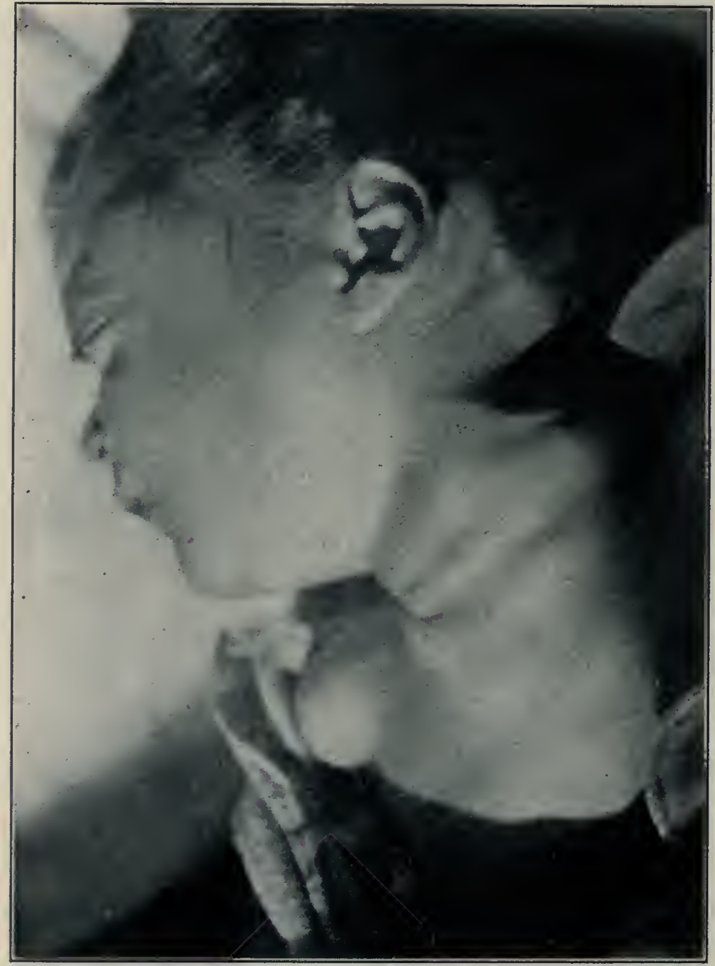

FIG. 2—Case 1. S. R., Female, aged 3½ years. Note the enlarged glands in neck; bulging in temporal region; and exophthalmos

Present illness followed closely upon the inception of the above pain and was characterized first by weakness and difficulty in walking. Dr. Lewis S. Aronson, who saw the child, states that the chief complaint at that time was weakness of lower extremities and edema of upper eyelids. There was no exophthalmos, no edema or swellings of the scalp, and the inguinal glands were the only ones enlarged. The child has been unable to walk for four months. Swelling of the face and neck and bulging of eyes began about six weeks ago. Has recently had slight cough.

Chief Complaint—Progressive pallor and weakness, swelling of neck and protruding eyeballs.

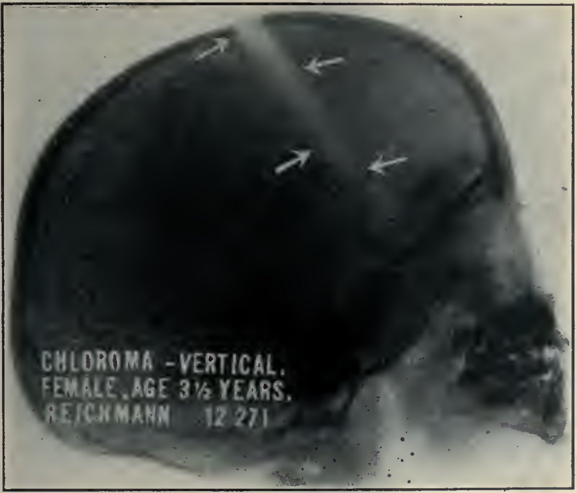

Fig. 3—Case 1. S. R. Note the marked separation of the coronal suture

Physical Examination—A well-developed and well-nourished child, anemic and slightly icteroid. Mentality and special senses do not seem impaired. Circumference of head 21 inches. Scalp edematous and tender. Beginning at root of nose and extending fan-shaped upwards over forehead is an edematous area 6 cm. wide at its base. Temporal veins distended. Face puffy, especially on left side. Pupils widely dilated, react very slightly; marked exophthalmos, both eyes. Ears show no discharge, no mastoid tenderness. Drums are lusterless, landmarks poorly seen, but there is no bulging. Tongue slightly coated, twenty teeth, upper incisors decayed. Tonsils hypertrophied. On left side of neck the anterior cervical glands are greatly enlarged, several large nodes being matted together. Over these are distended veins. There are also several enlarged glands in post-cervical region and a few on right side of neck. Some of these glands seem tender.. There is no rigidity of the neck. Axillary and inguinal glands moderately enlarged.

Lungs negative, except for slight dullness at left base posteriorly where breath sounds are higher pitched.

Heart is normal in size, no murmurs. Action rapid, regular in rate and rhythm.

Spleen percusses large, but is not palpable. Liver not palpable.

Knee-jerks exaggerated. No Babinsky. No Kernig.

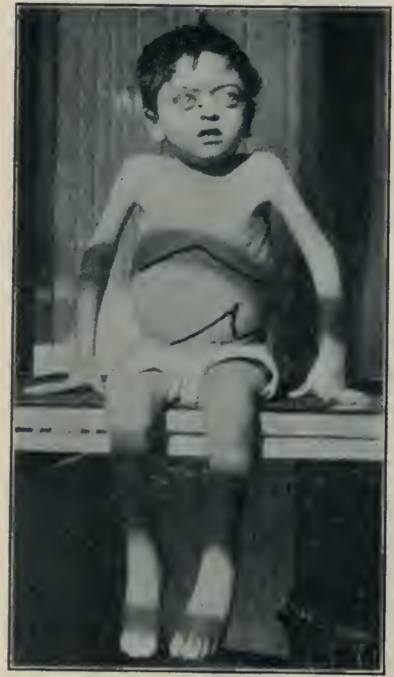

FIG. 4—Case 2. F. P., Male, aged 5 years. Note exophthalmos; bulging of abdomen; swelling of temporal regions of skull

CLINICAL NOTES AND FINDINGS

The temperature ranged from 99° to 102.4° F., usually around 100°F., and the pulse from 120 to 140.

January 28th. Red blood cells, 2,760,000; hemoglobin, 40 per cent.; white blood cells, 9,300; polynuclears, 63 per cent.; lymphocytes, 37 per cent. Red cells stain faintly, central depression marked, no unusual or nucleated forms observed. Vaginal smear negative for gonococci. Nose and throat cultures negative for diphtheria. Urine: Turbid, neutral, 1,025, no albumin, no sugar. Wassermann and von Pirquet tests negative.

January 31st. Eyes examined by Dr. Colman W. Cutler. *Left:* Retina has granular grayish look with few minute white dots scattered here and there. Vessels poorly filled. Nerve sharp and pale. *Right·* Retina same as in left. Appears unhealthy—anemic. Probably a trophic condition. Limitations of motility in all directions. Exophthalmos probably due to enlargement in the orbit behind the eye.

January 31st. Gland removed from right inguinal region. It was soft and friable, and contained white areas softer than the rest of the node.

February 3d. Child is worse; stuporous; vision and hearing seem impaired. Eyes examined by Dr. Cutler: Discs are a little paler. Retinæ unchanged. Loss of vision probably due to pressure on nerve.

February 4th. Exophthalmos increasing. Edema of forehead more extensive. White blood cells, 7,400; polynuclears, 63 per cent.; lymphocytes, 37 per cent.

February 5th. Vision apparently lost. Nerves still pale as before, but outlines definite. Enlarged glands in left side of neck excised by Dr. John Douglas. Specimen consists of three pieces, about 1 cm. in diameter, from cervical glands. On section they show small bright yellow areas.

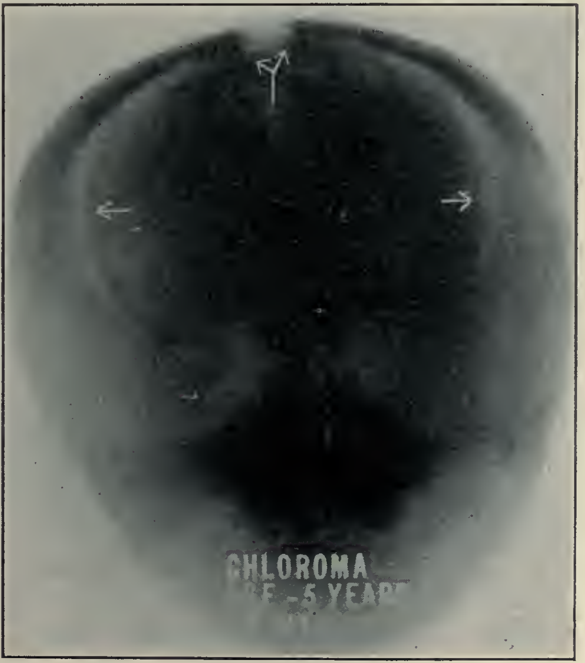

FIG. 5—Case 2. F. P. Note the wide separation of the suture lines of the skull, especially the coronal and frontal regions

Microscopic examination by F. C. Wood: The general picture of the sections is that of the marrow of cancellous bone in which the cells have been crowded together leaving out the red cell element. The normal lymphoid elements of the node are almost completely replaced by these cells, which resemble marrow cells. The largest portion of the cells is made up of mononuclears, which have a faintly staining protoplasm and a large, clear oval nucleus with a fine chromatin network. There are comparatively few mononuclears of the lymphatic type. Scattered through the sections are great numbers of giant cells of both the mononuclear and the polynuclear types. Some of the mononuclears have a large, round, faintly staining nucleus that nearly fills the cell and has a definite chromatin network. Others have a nucleus that takes an intense stain, is irregular in shape and shows no internal structure. The polynuclear giant cells have from two to ten or more nuclei. These appear to be in all respects similar to the megakaryocytes of the bone marrow. The larger number show distinctly separate nuclei, but in a few the nuclei seem to have an incomplete segmentation. Eosinophiles are easily found. These are mainly of the myelocytic type, but a few have larger cell bodies and appear to have two or three nuclei. Mitotic figures are occasionally seen in the smaller mononuclear cells. There is a type of mononuclear cells having a very deeply pyknotic nucleus, which is spindle-shaped and nearly fills the cell. These cells appear to be most abundant where the connective tissue is most dense. Many of the blood vessels are blocked by cells of this same type. The connective tissue framework is considerably in excess of that in a normal node. The microscopic examination of the node excised from the inguinal region discloses an appearance similar to that of the cervical nodes, except for the presence of a greater amount of connective tissue. *Diagnosis:* Chloroma.

February 6th. Urine negative. Bence-Jones albumose not present.

February 8th. Exophthalmos slightly diminished. Discs and retina same as before.

February 9th. Lumbar puncture: 8 c.c. of clear fluid removed, slightly increased pressure. Cells: 2 per c.mm., lymphocytes, 100 per cent.

February 10th. Red blood cells, 1,870,000; hemoglobin, 30 per cent. Several normoblasts found. White blood cells, 16,100; polynuclears, 50 per cent; lymphocytes, 50 per cent. Abdomen distended, no fluid.

February 11th. Swellings appearing in temporal and occipital regions of scalp. Knee-jerks active. No clonus. No changes in eye grounds.

February 12th. Child unconscious. Swellings on scalp seem cystic. No fluid obtained on aspiration.

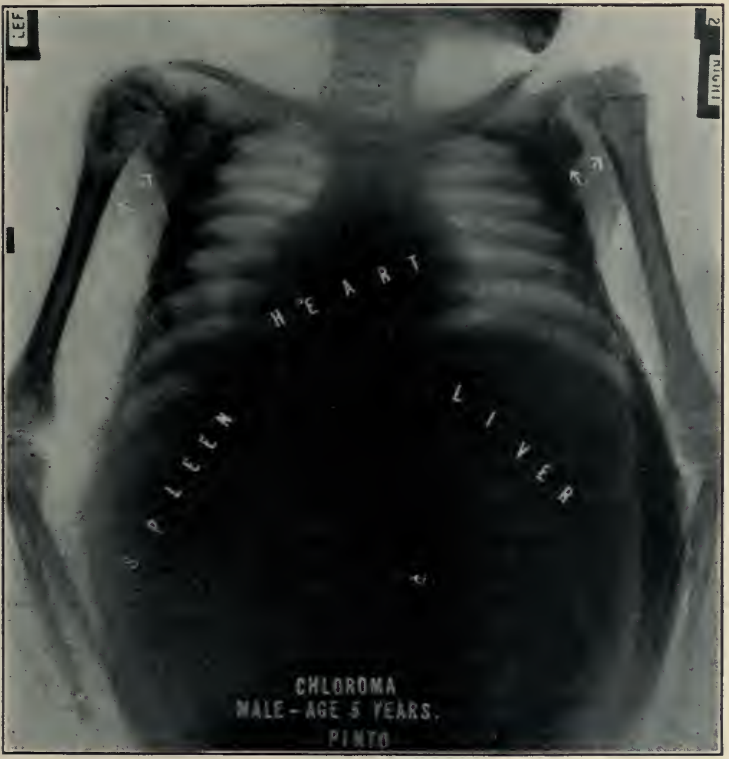

FIG. 6—Case 2. F. P. Note the marked changes in the medulla of the bones about the shoulder joint

February 13th. Circumference of head 22 inches. Child died. Postmortem examination not allowed.

Radiograph made January 29, 1913, showed marked enlargement of the mediastinal lymph nodes with slight displacement of the trachea to the right.

February 1, 1913. Anterior radiograph of the chest confirmed the findings of enlargement of the mediastinal lymph nodes.

February 5, 1913. Examination of the skull showed a most striking condition. There was a distinct separation of the coronal suture, producing a wedge-shaped gap measuring 1 cm. at the vault. (Fig. 1.)

February 12, 1913. Radiographic examination of the head confirmed the previous findings of separation of the coronal suture and also showed a separation of the parietal sutures.

Stereoscopic examination confirmed the finding of separation of the suture lines of the skull, including the occipito-parietal regions.

CASE No. 96,849. F. P., boy five years old. Admitted to hospital October 21, 1913. American, born of Italian parents. Four other children alive and well. Mother has had three miscarriages. Full term child, normal labor, nursed nine months, teeth at ten months. Walked at fourteen months. Always large and healthy.

Parents date present illness from vaccination seven months ago. A few days subsequent to this the child developed fever and this was followed by a stiff neck and later by tenderness of right knee, left knee, arms and shoulders. Five months ago swellings appeared on head most prominently behind the right ear, but these are said to have temporarily subsided in a few days as result of use of ice bag. At the time that the swellings appeared the eyes also began to protrude, and, although they have seemed to recede at times they have become much more prominent during the past month. Was told by a physician four months ago that the heart was affected. Feet and ankles swollen for one month and abdomen has been becoming more distended during that time. Vision and hearing have seemed normal. Has become very irritable of late.

Chief Complaint—Exophthalmos, swellings on head, and enlargement of abdomen.

Physical Examination—Patient is a poorly-nourished boy of five years who appears chronically ill; is emaciated and has yellowish hue to skin. Head is very irregular in shape, due to subcutaneous tumors. The largest, over the right parietal eminence, is about 6 cm. in width. All are attached to the periosteum and are fluctuating and slightly tender. All are within the region of the hairy scalp. The head measures 53.5 cm. in circumference. Ears show no discharge or mastoid tenderness.

Eyes are prominent, showing distinct exophthalmos. The lids are slightly edematous. Pupils are equal and react to light and accommodation.

Nose and mouth are normal, except for a few decayed teeth.

Neck shows no stiffness. There are masses of enlarged nodes on either side of the neck, in submaxillary regions and both in front of and behind the sternomastoid.

Lungs: There is some dullness at both bases posteriorly, where many fine, moist, subcrepitant râles may be heard at the end of inspiration.

Heart: Apex is 7 cm. to left of midsternal line in fourth space. Right border percusses 3 cm. to the right of midsternal line. There is a rapid diffuse impulse but no thrill. There is a loud systolic murmur heard all over precordium, most marked near the sternum and transmitted to axilla. A short presystolic murmur is heard just inside the nipple. Pulses are equal, soft and rapid and of fair force. There is a marked suprasternal pulsation.

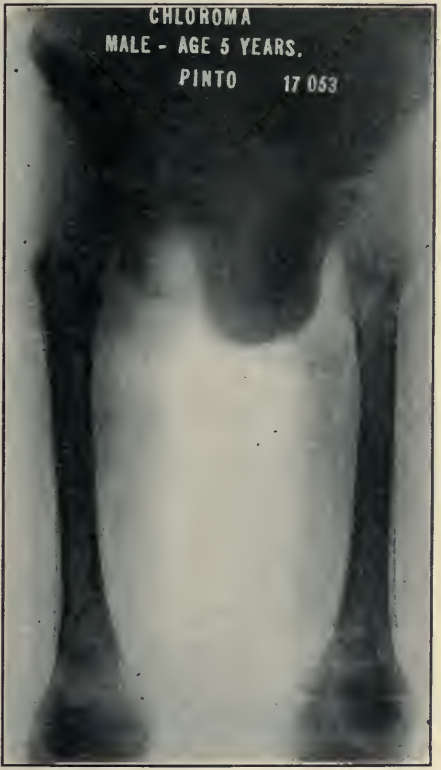

FIG. 7—Case 2. F. P. Note the periosteal changes combined with the medullary changes especially in the long bones

Abdomen is very prominent and is 64 cm. in circumference. Liver edge palpable at level of iliac crest and crosses midline at level of umbilicus. Spleen is also palpable below level of umbilicus.

Few enlarged nodes in axilla and groins. Genitals normal. Knee-jerks present. No Babinski. Slight edema of feet. Tibiæ tender.

CLINICAL NOTES AND FINDINGS

The temperature of the patient varied only slightly during his stay at the hospital, ranging from 100° to 101.2° F. The pulse ranged from 120 to 140, and respirations from 40 to 50.

October 21st. Red blood cells, 2,300,000; hemoglobin, 25 per-cent.; white blood cells, 13,500; polynuclears, 72 per cent.; lymphocytes, 28 per cent. Marked central depression of cells, few normoblasts, aniso- and poikilocytosis. Urine: Neutral, turbid, 1,030, no albumin. no sugar, diazo negative no Bence-Jones albumose, amorphous sediment.

October 22d. Nose and throat cultures negative for diphtheria. von Pirquet negative. Wassermann negative.

October 23d. White blood cells, 11,000; polynuclears, 60 per cent.; lymphocytes, 38 per cent.; eosinophiles, 2 per cent. Urine negative.

October 25th. Red blood cells, 2,400,000; hemoglobin, 25 per cent.

Eyes examined by Dr. Colman W. Cutler. No evidence of increased intracranial pressure. Right disc pale. Pigmented area, probably congenital.

October 27th. Two lymph nodes excised from right side of neck. The larger one is friable and apparently contains caseous material. The smaller one is firm and smooth.

October 29th. Red blood cells, 2,100,000; hemoglobin. 25 per cent.; white blood cells, 16,000; polynuclears, 64 per cent.; lymphocytes, 36 per cent. Urine negative—Bence-Jones albumose not found. The patient is getting progressively weaker.

October 31st. Swelling over right parietal region softer and almost cystic to touch. Exophthalmos not increased. Liver and spleen remain about the same size.

November 2d. Red blood cells, 3,100,000; hemoglobin, 30 per cent.; white blood cells, 16,500; polynuclears, 64 per cent.; lymphocytes, 36 per cent.

November 5th. Physical signs in general, unchanged. Swellings on skull increasing in prominence. Lower extremities edematous. White blood cells, 12,500; polynuclears, 72 per cent.; lymphocytes, 28 per cent. Slight epistaxis.

November 7th. Red blood cells, 2,300,000; hemoglobin, 28 per cent.

November 11th. Exophthalmos apparently diminished. White blood cells, 17,000; polynuclears, 68 per cent.; lymphocytes, 32 per cent. Eight normoblasts found in counting 100 white blood cells. Urine normal. Slight epistaxis.

November 13th. General condition failing. Upper lid of left eye discolored and edematous, apparently due to infiltration from tumor mass above. Purulent discharge from conjunctiva. White blood cells, 13.500; polynuclears, 66 per cent.; lymphocytes, 34 per cent.

November 14th. Lymph nodes excised from left side of neck. Abdomen measures 67 cm. in circumference. General condition the same. Voice much fainter. White blood cells, 24,000; polynuclears, 78 per cent.; lymphocytes, 22 per cent. Discharged against advice. Patient became progressively weaker, and died about ten days after leaving the hospital. Postmortem examination not allowed.

Report on examination of lymph nodes by Dr. F. C. Wood:

Macroscopic: Specimen consists of single gland from neck measuring 1.5 x 1.2 x 0.8 cm. The capsule is thin and gland appears congested. On section the tissue has yellowish tinge with small hemorrhagic areas. There are a few light areas suggesting necrosis. In general, the tissue is pale and cellular. A small gland attached to the capsule appears hemorrhagic.

Microscopic: In the peripheral lymph sinuses there is a collection of round cells, slightly larger and less deeply stained than the lymphoid cells. They lie in a delicate reticulum and there is considerable blood about them. In some portions of the gland these have displaced the lymphoid structures, which appear as deeply staining islands. Some portions of the structure are markedly hemorrhagic. *Diagnosis:* Chloroma.

Radiographic examination made October 22, 1913, showed a most striking condition of the skull; there was a distinct separation of the suture lines, especially marked in the region of the coronal suture and the parietal sutures. The separation of the frontal suture measured about 2 cm. at the vertex. (See Fig. 2.) The condition is similar to that previously noted in a case of chloroma and this appears to warrant the probable diagnosis of this condition when taken in conjunction with the findings in the other bones.

Examination of the chest showed an extensive involvement of the mediastinal lymph nodes.

Examination of the upper abdomen showed the diaphragm pushed upward on both sides, indicating a distinct enlargement of the liver and of the spleen.

The bones of the upper extremities showed marked changes of a very peculiar type. The medullary portion of the long bones showed a peculiar mottling due to rarefied areas. The periosteum was distinctly raised from the surface of the bone over the greater portion of the shaft. The epiphyseal region showed comparatively little departure from normal, except for changes above noted. The peculiar combined involvement of the medullary cavity and the periosteum has not been observed in other bone lesions, and as the gross and pathologic findings agree with those found in chloroma it appears sufficient to warrant a diagnosis of chloroma when taken in conjunction with the history of the case. (Figs. 3 and 4.)

Examination of the lower extremities showed an involvement of the long bones exactly in the same manner as observed in the upper extremities, that is to say, there is a periosteal change combined with a medullary change.

Inasmuch as a postmortem examination was not allowed in either of these cases, and the blood picture was never found to be that of a leukemia, the diagnosis might perhaps be questioned. The clinical history and findings were so characteristic, however, and the X-ray examinations so confirmatory that it would seem difficult to arrive at any other conclusion. As has been pointed out by several investigators, the blood picture varies greatly in the reported cases and also in the same case on different examinations. The peripheral circulation may not contain the atypical cells of leukoblastic origin which predominate in the tumor masses. An aleukemic chloroma has even been suggested. The fact that our cases did not give the picture of a leukemia during the time they were under observation would not seem, therefore, to invalidate the diagnosis.

The glands which were examined in our cases did not present the characteristic green color which originally gave the name to the disease. This fact, again, does not seem to be any argument against the diagnosis, for the green color is much more characteristic of the tumors involving the bones and adjacent structures and we have no reason to doubt that these deeper tumors would have manifested the green color in our cases.

The color is no longer considered an essential feature of the disease, but it would perhaps be better to class a case which was thoroughly examined and did not show the green color as a nonchloromatous leukemia.

Our present knowledge of the disease leads to the conclusions which were recorded by Dock and Warthin, that

(1) Chloroma is a tumor-like hyperplasia of the parent cell of the leukocytes, primary in the bone marrow, the periosteum being involved only secondarily.

(2) As a result of this leukoblastic hyperplasia atypical leukocytes or leukocytes corresponding to some of the normal types may appear in the blood stream in varying numbers.

(3) The essential difference between chloroma and other forms of leukemia is the marked neoplastic character of the former and the formation of the green infiltrations and metastases.

NOTES ON RHEUMATISM IN CHILDREN—Mary H. Williams (Lancet, 1915, Vol. I., p. 1,284) believes that rheumatism is a disease which almost always begins in early childhood, and that in its crippling effect it is second to none. It is responsible for a large amount of heart disease and for an infinitely larger number of cases of ill health, which are frequently labelled "debility." The author discusses the significance in children of "growing pains," pyrexia, tachycardia, nervousness, "bilious attacks," chorea and anemia—many of which conditions should, in her opinion, be regarded as of rheumatic origin. She maintains that heart disease in the child is practically always due to rheumatism. Three important points in treatment are: (*a*) rest, (*b*) "keep warm and dry," and (*c*) good food.—*The British Journal of Children's Diseases.*

CONGENITAL PULMONARY STENOSIS—D. Martin (Lancet, 1915, Vol. II., p. 976) briefly describes 4 cases of congenital pulmonary stenosis in children without the usual obvious signs, the condition being discovered during the routine examination of school medical inspection. In the author's opinion the cases serve as an illustration of the utility of the medical inspection of school children for the detection of unrecognized conditions requiring treatment and care. Such precautions will undoubtedly maintain, and ultimately increase, the virility of the future generations.—*The British Journal of Children's Diseases.*

OBSCURE MANIFESTATIONS OF OTITIS MEDIA IN INFANCY AND CHILDHOOD*

BY JOHN ADAMS COLLIVER, A.B., M.D.
Los Angeles, Cal.

I am not an otologist, nor is it my intention to invade his territory. It only will be my endeavor to call your attention to a sadly neglected and vitally important field, which stands practically untouched, between the general practitioner and pediatrician on one side and the ear specialist on the other. I refer to the early diagnosis and treatment of acute otitis media.

Inasmuch as by far the greater majority of these cases with their serious and numerous complications are found in infancy and childhood, it is the legitimate field of the pediatricians. Also, as the great majority of these children's cases are either neglected, overlooked, or wrongly diagnosed, I feel that the burden of responsibility therefor rests upon us rather than the ear specialists. Sad but true, the damage has been, as a rule, largely done when the otologist first sees the case, which is usually then a discharging ear, and in which event neither the child nor the specialist has been given a square deal. As a result, the neglect often forces the case to an unnecessary mastoid operation or progresses to a more serious and fatal result. The object of my paper is to demonstrate, if possible, how many such disasters can be avoided.

Why is this field so neglected? Many physicians are living under the old teachings, regarding ear trouble lightly. The laity has a reflection of this same view. It is never an easy matter for physicians to convince the family of the seriousness of ear involvement, especially when there is little or no pain or discharge. It is a regrettable fact that many in the profession do not regard ear involvement serious without pain.

Some other reasons for the neglected field are found. Primary is the lack of proper or sufficient training in ear examination. This results later in the ears being overlooked or superficially examined. Then there is the general feeling that this is the field of the ear specialist, and no examination of the ear is made at all. The other most important reason is the fact that the manifestations of the symptoms of otitis media are so obscure that they are either entirely overlooked or wrongly diagnosed. It is upon this latter that I wish to lay emphasis.

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* Read before the Fifty-third Semi-annual Meeting of the Southern California Medical Society, December 1, 1915.

Before doing this, however, allow me to impress upon you some of the disastrous results of this neglected field of our work, and the importance of its proper consideration. J. Leslie Davis, in a review of the situation appearing in the American Medical Journal of Children's Diseases, says that 90 per cent. of the deafness in adults is due to preventable causes in childhood. We have growing up into maturity numerous children with offensive, long-standing ear discharges, resulting in impaired hearing, and later, in adult deafness. In addition to this, we have mastoiditis, meningitis, cerebral abscess, sinus thrombosis, facial paralysis, and other serious complications.

One of the most serious results, however, is the unnecessary mastoid operation. "Unnecessary" is used here advisedly, because it is generally conceded by the otologist that otitis media precedes mastoiditis, and that an early incision usually saves an operation. This early attention also tends to prevent the other complications just mentioned.

Primary infection of the mastoids from the blood stream is rare; only 26 idiopathic cases in all the literature are reported. (Dabney.) Even many of these are open to question. At the last meeting of the American Medical Association I listened with interest to the long discussion upon mastoid operations, and the general conclusions were that the operation was becoming less and less frequent, due partly to the supposition that the general practitioner is learning that an earache is a serious thing and demanding attention. They also all agree that acute mastoiditis is always preceded by ear involvement, and may even go to operation with few objective symptoms, thus illustrating the necessity of close observation and frequent examinations. A very consistent opinion held by practically all specialists is that death should not occur from acute mastoiditis or its complications, provided the early stages of otitis media are recognized and properly treated. With more careful work, I predict that in the future a mastoid will be a rare operation.

Why is otitis media so frequent in children? It is a well-established fact that otitis media predominates in infancy and childhood. This frequency, however, gets less as the child grows older, although even in older children it is much more frequent than in adults.

All cases of otitis media result from infection through the Eustachian tube. The inner part of this tube in children is imbedded in adenoid tissue. Phillip says it is more frequent in infancy because of this adenoid tissue, which is more developed at that age. All authorities agree that the child is predisposed by the presence of adenoids and tonsils. In addition to this, in the child, the Eustachian tube is shorter, somewhat larger in diameter, stands more open, and runs more at right angles to the pharynx, and is set lower than in adults. The lower portion is set in a mucoid tissue, the tube projecting somewhat above the surface. The infant drum membrane is not so tense, yields more readily to pressure and ruptures easier.

Any change in pressure caused by crying, sucking, nursing, vomiting, sneezing of infancy, and blowing the nose in older children, tends to force any infective material which may be in the throat at the time into the Eustachian tube. W. H. Bowen, of London, thinks a large percentage of otitis media in children is due to the comforter. For the reasons mentioned, it is always consistent to direct ear treatment to the nose and throat—the focus.

As stated above, the tonsils and adenoids are largely responsible for ear involvement. It has been especially observed that when tonsils and adenoids are removed, the liability to middle ear infection is lessened. It is the hidden, submerged and retentive tonsil, regardless of size, that gives rise to the greatest damage. Equally as bad is the retained or incompletely removed tonsil. The secretion from the crypts has a greater tendency in children to coagulate and become highly toxic concretions which are reabsorbed. This is more important than the adenoid. McKinzie believes that over 100,000 have been spared the sense of hearing by the early removal of tonsils and adenoids. It is generally agreed that the chronic discharge of otitis media cannot be cured locally without the removal of the adenoids. It was also agreed at the last American Medical Association meeting that there were many less mastoid operations since the removal of adenoids and tonsils had become general.

It is not my intention to go into the bacteriology of the subject any more than to mention that the streptococcus contribute between 25 and 50 per cent. of the cases; staphylococcus aureus and albus, from 8 to 14; pneumococcus from 12 to 14; streptococcus mucosa from 5 to 10; mixed from 20 to 30; diphtheria coli communis, tuberculosis, etc., from 2 to 4.

Otitis in Infectious Diseases—No infectious disease is free from the possibility of ear involvement, and the ear involvement often is so insidious and masked by other symptoms that it is easily overlooked or taken as an exacerbation of the infection, unless frequent examination of the ear is made.

Measles, for instance, is accompanied by rhinitis and extra-secretion, which extends to the posterior nares and over the open Eustachian tube—from there it is easy to reach the middle ear. I had the opportunity to examine many ears in the early stages of measles, and the slight congestion of the drum was almost as consistent as the Koplik spots. Cases in which the adenoids had been removed showed less frequent involvement. You usually find swelling of the lymphatic nodes on the affected side with the ear involvement, though, if the child is old enough, he may complain sometimes of earache, but more times of headache or stiffness of the neck. I have seen a few cases bordering on convulsion, and others to opisthotonos. All these obscure symptoms were relieved entirely by paracentesis.

In scarlet fever otitis media may occur without nose involvement. Pain may be entirely absent, and the case go on to spontaneous perforation. There is usually tenderness in these cases over the outer opening of the canal. I have found here and also in Professor Pirquet's Kinderklinik that the glandular involvement accompanies or precedes ear involvement on the same side. Otitis media is usually a late complication, although in Southern California every case I have seen has been within the first week. It is very essential to get these cases early, as otorrhea is the result of improper treatment, and may continue for years, or result in total impairment of the hearing.

In Influenza—Pfaundler considers that every child suffering from otitis media complains more or less from severe pain, but it is not always referred to the ear. Holt says that these cases appear decidedly ill, yet show no definite symptoms. Frequently inspection reveals a dark-red opaque drum. As in the above diseases, these cases show an unaccountable rise in temperature, which is relieved entirely by paracentesis.

Ear involvement in diphtheria is a very serious infection. It begins insidiously, and later becomes virulent and very painful in older children, causing severe headache and often disturbance of consciousness. Careful frequent examination of the ear should be made, otherwise the first indication of otitis media may be rise in temperature, followed by a bloody purulent discharge. Spontaneous perforation is apt to be sealed up by a false membrane, which is followed by destruction of ossicles and necrosis, which may extend to the labyrinth, which means deafness.

Pneumonia contributes as much as 15 per cent. of these cases. No doubt many cases are overlooked by being taken for extension of pneumonic area. Close daily examination is the only method of avoiding this. The same is true of empyema—one suspects a pocket of pus when in reality it is often otitis media. Early stages of typhoid and otitis have more than once been confused.

In rhinitis and other infectious diseases we find similar complications. We also find it confused with intestinal toxemia. In each case the symptoms are so obscure as to be easily taken as an exacerbation of infection rather than an ear involvement.

If one is looking for the symptoms of adult otitis media in infancy and childhood, practically all his cases will come to spontaneous rupture. As Holt says, a discharge is often the first symptom which leads the physician to suspect ear trouble. Location of pain in children is incorrect and untrustworthy, especially so in young children and in infancy. The only good hint we have of localization is the tendency of an infant to pull its ear or have its hand frequently on the affected side of the head. As Morse says, the conditions are not recognized because the definite symptoms are looked for, and the symptoms that are found are attributed to some other cause. Practically the most common symptom is the presence of fever, but inasmuch as the ear involvement is a complication of an existing infection, the ear is overlooked and the temperature attributed to the course of the known condition.

I have seen persistent cough with slight temperature—due entirely to acute otitis media—clear up under treatment. A perfectly healthy child refuses food without apparent cause, vomits and has other gastric symptoms with high temperature. Usually these symptoms are enough to account for gastric or intestinal indigestion, but very frequently they are the only symptoms of an acute otitis media. In older children pain in the ear is an early and transient symptom, but is soon followed by other symptoms which mask the ear trouble, and such trouble is even later forgotten.

Pathologists tell us that over 90 per cent. of ear diseases become purulent, to be found only at postmortem. Ponfick reports 100 autopsies on children under four who died of various diseases; 91 of these showed purulent otitis media; 9 were normal; 79 of the 91 had both ears involved, 14 only one; only 10 of the 91 were diagnosed before autopsy. Kerley, in 1910, reported 200 cases of otitis media, 69 per cent. of which showed absence of pain.

I have had more than one case with history of restlessness, feverishness, rolling and plowing head in pillow at night, possibly biting fingers, refusing food without apparent cause, crying easily, maybe vomiting, with changing in color and frequency of stools—all physical signs negative—find one drum congested—cleared up under treatment directed to the ear.

Boy, two years, in Vienna Hospital, diagnosed meningitis; neck stiff; Kernig marked; tache cerebrale; irregular respiration; temperature from 100° to 102° F.; extremely irritable; cries continually; refuses food; peculiar, almost hydrocephalic, cry; hits head against iron bed railing; throws head on mattress; always right side striking; watched him for an hour; pulling hair, screaming, striking head; spasmodic cramp of face, like beginning convulsions; spinal puncture negative; ear examination, right drum involved; all symptoms cleared at once after paracentesis.

Two other cases diagnosed meningitis due to same cause.

Consultation of pneumonia case—girl six years. Ran crisis; temperature normal two days; sudden rise 101°, next day 102°; some headache, restlessness, irritation, sleeplessness, refusing food; no change in lung could be found; left ear drum bulging.

Scarlet fever—boy five years. First week eruptions fading; throat still sore; temperature had been 100° for two days; sudden rise 101° and 102°; boy complained of stiffness in neck; refused to lie on right side; glands enlarged right side and somewhat tender; urine negative; lungs O. K.; right otitis media; cleared up immediately.

Child nine months. Rhinitis; running nose; refuses food; loses weight; vomits easily; stools curdy, with some green; coughs, especially night and morning; temperature from 99° to 100⅗° four days; difficult to make examination; screams when touched; both ears involved.

Have seen several other cases following or accompanying rhinitis.

Girl seven. Cough every day; anorexia; lungs negative; temperature ranged from 99° to $100\frac{3}{5}$°; throat red; small, imbedded, deeply-pitted tonsils; numerous small postcervical glands. Some headache, but no history of earache. All cleared up on directing attention to the ear.

Girl three years. Refusing food; crying; biting fingers; restless at night; temperature ranging from 99.2° to $100\frac{3}{5}$°, two days; cough; physical examination·negative, excepting ear drum dark red. Incision; old blood and pus; all symptoms cleared up.

Consultation boy four years. Case empyema, following pneumonia. Had had parts of two ribs resected and was doing fine with temperature normal for few days, when suddenly temperature shot up for part of the time during the day, usually down in the morning; regular septic temperature; drainage good; pus thinner, some dullness about incision; fear in this case of pus pocket; complete examination revealed bulging ear drum; paracentesis performed, and all septic temperature disappeared.

Boy one year. Hurry call; high temperature, 104°; respiration 75; pulse 140; movement of the ala nasi; prostrated; cough; left side of chest upper region high pitch; picture of pneumonia, but auscultation negative, due to otitis media, which cleared up under paracentesis.

All these cases are simple illustrations that no examination of a child is complete without an ear examination. If more frequent ear inspection was made during infectious diseases there would be far less necessity for mastoid operations, and many other serious complications would be avoided. Otitis media can only be discovered by frequent examinations in very young children. There is no direct symptom of it. Disregarding this, I have seen some of the best men in the world caught up.

To the internist, the stethoscope is indispensable to proper diagnosis, but for the pediatrician equally important, if not more essential, is the auriscope.

Baker-Detwiler Building.

THE NECESSITY FOR EARLY DIAGNOSIS AND CONTINUOUS TREATMENT IN CONGENITAL SYPHILIS

BY JOHN STURDIVANT READ, M.D.
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Many children who are born with luetic infection show no signs at birth; many show such slight traces of the taint that unless carefully examined a diagnosis is not made until grave tertiary lesions appear; probably all of them, if they live to maturity, are severely damaged by acting as host to the spirochete over a course of years. Some succumb early and die of this poison or are so weakened by it that they fall victims to some intercurrent disease; others appear healthy and vigorous until near puberty and sometimes far beyond that period, when an eye, ear or cerebrospinal lesion announces the presence of the organism.

Judging from cases seen during the past few years, it appears that the majority of these congenital cases are not receiving the full benefit of modern methods of diagnosis and therapy. The children of parents known to have or to have had syphilis should be considered luetic until proved otherwise. If no clinical signs are apparent, blood examination should be regularly made. If there is a suspicion of a taint in the child and the serum is negative, Wassermannize the parents, and if these are negative treat the child and again test, for often after a small amount of treatment a positive reaction will appear. If there is in the parents any history of chancre many years back, a provocative injection of salvarsan or mercury should be given and often a negative serum will read positive at the next test.

Congenital syphilis is found in from 2 to 5 per cent. of the children admitted to large metropolitan hospitals. The earliest symptom is snuffles, which may occur at birth, but this alone is not sufficient evidence on which to make a diagnosis. During the next few weeks, rarely later than the twelfth, the hoarse cry, the rash and marasmus develop. About 2 per cent. of these will develope pemphigus, which generally appears during the first few weeks and, while a grave manifestation, is by no means always fatal. There is a form of pyogenic pemphigus which sometimes occurs in the newborn which must be differentiated from syphilis. The finding of the organism is the surest method of diagnosis.

The involvement of the liver, spleen, testicles, bones, eyes, nails and other tissue is too significant to escape notice. There are symptoms which in an unsuspected case should arrest the attention and call for a differential diagnosis excluding the presence of syphilis, *i.e.,* marasmus in a breast-fed baby showing no signs of indigestion, extensive peeling of the palms and soles a few weeks after birth, onychia, a thinning of the eyebrows in an infant of a few months, is very suggestive; alopecia and any eye lesion in the very young.

Still, of London, reports that in 60 infants under one year, 9 showed choroiditis, iritis, or both, and that out of 100 consecutive cases of congenital syphilis 23 showed eye lesions.

An unexplainable nephritis, a paroxysmal hemoglobinuria, a hard, swollen testicle, occurring under one year of age, epiphysitis within the first three months, marked by a rather acute onset of pain on motion and an apparent paralysis of the limb—the occurrence of any one of these may be due to the presence of the spirochete in the affected tissue and to nothing else. In older children a chronic synovitis with effusion is by no means rare, and sometimes the invasion of the cerebral tissue is first evidenced by excessive outbursts of violent temper or by a gradual heaviness or dullness passing on to imbecility in children who previously have been normal.

Spirochetes have been found in the umbilical cord, in the placenta and in the blood shortly after birth. Menetrier and Duval were able to recover them from the bullæ on the foot of an otherwise apparently healthy child twelve hours after birth. In the syphilitic fetus there is no tissue in which large groups of this specific organism have not been demonstrated. Remembering this and recalling the necessity of long-continued systematic medication in adults, why should we be content with less radical measures for children? Why should we be content to treat the external clinical lesions and then to wait hoping the cure is complete only to be met with grave tertiary manifestations years later? The objection of parents to the medication of an apparently healthy infant or child is natural, but can be overcome, and their active co-operation secured, by explaining the meaning of the serum or other reactions. The reports from competent pathologists demonstrate to them the presence of a definite, though hidden, disease, and frequently we find them asking for a renewal of the test when the busy doctor has forgotten that its repetition is due. If the luetin test proves reliable our work will be simplified. If unable to puncture the vein in getting blood the suction apparatus of Dr. E. C. Burrows may be used. Often this will fail. The raising of a blister and withdrawing the serum with a glass-barreled hypodermic syringe is another method which frequently is satisfactory. In the event of a negative reaction, repeated tests at intervals of six to twelve months should be made. Sometimes a negative test will become positive after a provocative injection of mercury or salvarsan.

Three cases seen during the past two years follow:

CASE 1. A. W., girl three years of age; white; Norwegian.

Diagnosis—Interstitial keratitis.

Breast baby, sixteen months; strong, healthy child until four years of age. There was then a swelling in one eye with interference of vision. Later that year the second eye became involved. Treatment was given for one month with improvement. Two years later there was a return of the cloudy eyes and poor vision. Diagnosis was then made and mixed treatment was administered at irregular periods until the present.

Examination—Interstitial keratitis. Two upper incisors notched. Wassermann 4 plus. Anemia, headaches, otherwise well developed and strong. Under weekly injections of Hydrarg. Sal. and intravenous salvarsan, three injections at two weeks' interval, the anemia and headaches disappeared and the Wassermann dropped to 2 plus. The vision was much improved.

CASE 2. M. G., girl fourteen years of age; white; Hebrew.

Diagnosis—Interstitial keratitis.

Breast baby, very sickly for three years; healthy afterward until eighth year. Then she began to have attacks of violent temper and epileptiform seizures. She was seen by the family physician and K. I. and inunctions were given for two months, with apparent recovery. At her twelfth year there was a definite failure of vision. Seen in March, 1912, at the time there were cloudy corneæ, notched upper incisors and 4 plus Wassermann. Under the administration of salvarsan, mercury and K. I. over intervals of three years, the Wassermann was reduced to 1 plus, and she can now read large type and go on the street alone. The opaqueness of the cornea is noticeably diminished.

CASE 3. H. C., sixteen years of age; white; American; only son of an intelligent man, who carefully watched him for any signs of syphilis, as he himself was infected four years before marriage. He reports that aside from enlarged tonsils and some focal eye trouble, he had always been remarkably well. He had asked the physicians in each case whether there was any sign of inherited syphilis and had been assured there was none. When I saw the boy he was the picture of health and was brought by his father because of a small, brown patch which appeared on his foot. There was nothing significant about this, but on account of the paternal infection the boy was Wassermannized. A 3-plus Wassermann was discovered. He was given a course of Hydrarg. Sal. and four intravenous injections of salvarsan.

In Cases 1 and 2 grave permanent lesions might have been avoided if vigorous continuous treatment had been persisted in. In Case 3 a morally courageous father has probably saved his apparently healthy son from some disabling condition in later life.

The treatment needed is the same persistent, selected application of salvarsan, mercury, K. I. and tonics as in adults. Mercury is best borne by the very young in the form of grey powder, ½ to ¾ grain *t.i.d.* Combined with soda bicarb. and pulv. aromat. it is well borne for long periods. Calomel is more irritative to the gastrointestinal tract.

When dry medication is rejected by the child some liquid form is needed. Liquor. Hydrarg. Perchlor., minims x *t.i.d.*, is generally well borne if combined with castor oil, minims v, and Tr. Opii, minim ½.

The bichlorid in solution is taken by some children without discomfort. Inunctions of Ung. Hydrarg. or the oleate are more effective, and as long as the skin is tolerant it is the preferable method. In gravely progressing lesions not controlled by these measures, muscular injections of the hydrarg. biniodide in aqueous solution, grain 1/30 to grain 1/200, twice a week for six or twelve doses, are necessary.

Intravenous injections of the cyanide of mercury, 1 c.c. of a 1 per cent. solution, have been used.

In congenital syphilis tertiary lesions are often present at an early age and potassium iodid is as valuable here as in the adult. It is well tolerated by children; 10 to 30 grains *t.i.d.* to a child of five years can be given. In all stages, and especially in grave, progressing lesions, the administration of salvarsan intravenously is of great value. One-tenth of a gram to a two-year-old is a safe standard, which must be modified according to the condition of the patient and the intensity of the disease.

Too many of us are still under the influence of Hutchinson's teaching, that in infancy treatment is to be given only while there are symptoms. This is as irrational as it would be in adults. We must judge by clinical signs, serologic and other tests, the quantity of medication needed and the length of time it must be continued.

Careful serologic studies show that "there appears to be no lasting passive immunity in syphilis (Kolmer); that most examples of so-called immunity in syphilis in both the mother (Colles' Law) and the child (Profeta's Law) are due to the actual presence of pallidum in the tissues and are really latent infections."

REFERENCES.

1. John A. Kolmer. "A Text-Book of Infection, Immunity and Specific Therapy."
2. Congenital Syphilis. G. F. Still in "A System of Syphilis," D'Arcy Power and J. Keogh Murphy.

AMMONIA AND UREA CONTENT OF INFANTS' STOOLS—J. L. Gamble's (American Journal of Diseases of Children, 1915, Vol. IX., p. 519) experiments show that there is practically no danger of loss of ammonia nitrogen from stools during collection and storage, unless the specimen is allowed to lose moisture; but that during drying a very serious loss may occur, often as much as from 15 to 20 per cent. of total nitrogen from fresh stools, while from stools left standing for two days at room temperature one-half of the total nitrogen may escape measurement. Urea nitrogen was determined in fifteen twenty-four-hour specimens from practically normal babies. The average for the fifteen stools was 13 mg. or 2.0 mg. per gram dried stool. The average in per cent. of total nitrogen was 3.5. The proportionate relationship between urea nitrogen and ammonia nitrogen is widely variable. Whether or not some of the urea found in stools was excreted by the intestinal wall, the writer is unprepared to say. That the intestinal flora are capable of producing urea is evident from an increase in the amount of it found in stools standing several days at room temperature.—*The American Journal of Obstetrics.*

SOCIETY REPORTS

THE NEW YORK ACADEMY OF MEDICINE

Joint Meeting of the Sections on Obstetrics and Pediatrics

Held March 28, 1916

George W. Kosmak, M.D., in the Chair

Dr. George W. Kosmak, the Chairman of the Section on Obstetrics, said that at the request of Dr. Haynes he would point out briefly why a joint session of the Section on Obstetrics and the Section on Pediatrics should prove of interest and advantage to members of both sections.

The trend of modern medicine has been toward specialism. Although this development has undoubtedly contributed to the advance of medicine and has aided in its transformation from an art to a science, it is essential to remember that the various apparently isolated organic systems of the body are more or less closely inter-related and interdependent. Therefore the practitioner in the special branches of medicine is subject to the same necessity for coördinating his work with that of the immediately related subjects. This is of peculiar significance in the question which is brought up for discussion this evening, namely, "The Care of the Newborn Infant Considered from Both the Obstetric and Pediatric Standpoints." The obstetrician unfortunately has concerned himself more with the care of the mother than of the infant, and usually has dismissed the latter from his mind unless some startling abnormality occurred. The pediatrist is necessarily interested in the baby as such, and only too often is called in to care for a child with errors of growth and nutrition that might have been corrected or avoided earlier in its life. The subject of prenatal development is receiving increased attention by research workers, but, unfortunately, the practitioner of medicine is unacquainted with their observations and the practical application of these observations to the human subject have not been extensively made. Defective development has been ascribed to maternal intoxications of various kinds and a healthy ovum may give rise to a monster when discharged into a diseased uterus in which it fails to become properly implanted or nourished. In the lower animals several investigators have definitely shown the effects of injurious substances on the development of the embryo, and within the past year Werber has succeeded in producing deformities of the most varied type, such as cyclopia, ear defects, hydrocephalus and alterations in the circulatory apparatus by exposing the fertilized eggs of one of the teleost fishes to oxybutyric acid and acetone. These are experiments of great interest and value and lead us to believe that possibly various toxic products in pregnant women, resulting from altered metabolism, may account for departures from normal fetuses at birth or even for defects that manifest themselves in individuals later in life. Such imaginings naturally bring one into the realm where it is difficult to distinguish between fact and fancy, but they should lead to further experiments on higher animals and to more detailed observation in the human subject. It is in fields such as these that the obstetrician and the pediatrician must extend their attention, for by correlated work it will be possible to contribute something more definite than the fanciful theories referred to, which will in time make for the betterment of the race. With these views in mind the chairmen of the Sections meeting here this evening have developed the programme to be presented and trust that this and similar meetings will tend to bring these two specialties closer together and by their united work bring the subjects to be discussed more prominently before the general practitioner.

CORRELATION OF THE PEDIATRIST AND OBSTETRICIAN

Dr. Roger H. Dennett declared that in no other branch of medicine was there a specialty which calls for both surgical technique and the peculiar mental attitude of the internist. The obstetrician is essentially a surgeon; the pediatrician is essentially an internist. It is true that these two specialties have been combined in a mediocre sort of way, but no single individual has ever achieved eminence in both.

It has been the custom, ever since specialism developed, for the obstetrician to take care of the newborn babies from birth until the second, third, or fourth week of life. The pediatrician has been the consultant only, called in when things went extremely wrong. This is true both in private practice and in the charitable hospitals among the poor. Dr. Dennett said that there was not in New York City, to his knowledge, a public lying-in service, large or small, or a private obstetrical institution, in which newborn babies were visited each day by a pediatrician, just as the mother is cared for by an expert.

There can be no question that the study of congenital diseases is one of the most neglected, and, at the same time, most needed phases of medicine. It is not only the mortality, but the morbidity that should be considered.

This is, therefore, the first reason why the pediatrician should have the care of infants from their birth. A second reason is that the mortality could in all probability be enormously lowered if proper attention were given to these diseases. Finally, the morbidity and its peculiarly distressing accompaniments may be lessened during the first year by preventing many cases of malnutrition and gastrointestinal disturbances. The subject of the early mortality from congenital disease is now under investigation by the Bureau of Child Hygiene of the New York Health Department and they have shown that 40.3 per cent. of all the deaths under one year are due to congenital diseases, whereas, the deaths from respiratory or diarrheal diseases are little more than one-half that number, 23 per cent. The Health Department further states that 70 per cent. of all deaths due to congenital causes may be classed as preventable, and that 48 per cent. of these deaths occurred in the first ten days of life. (New York Board of Health Report, Third Quarter, 1914.)

When it comes to the subject of morbidity statistics are less available. It is probably the general opinion of pediatricians, however, that at least 50 to 75 per cent. of all their difficult feeding cases could have been averted had the pediatrician had the opportunity of supervising the infant's care from birth.

Even though it may be disputed whether the obstetrician should turn over all his infants at birth to the pediatrician, there can be no question that both the mortality and the morbidity might be lowered by doing so at two weeks of age. That is, whenever the obstetrician discharges the mother he might recommend that a pediatrician be consulted for a thorough physical examination and for the purpose of obtaining dietetic and hygienic advice for future use. The follow-up work now being done by the Babies' Welfare Association is a start in the right direction, so far as public institutions and lying-in hospitals are concerned.

The Babies' Welfare Association cared for 4,000 cases last year, and this year the numbers are growing as the work is becoming known.

Dr. Dennett thought the proper correlation of the pediatrician and the obstetrician could be brought about in the following way: (1) By giving as much careful attention to the appointment of the pediatric staff of the lying-in hospitals as is given to the appointment of the obstetrical staff. (2) The pediatrician, once having been appointed, should make his daily rounds and study and observe his cases from a clinical, laboratory and pathological standpoint, as he was doing now in his own children's and babies' wards. (3) The obstetrician should educate the laity to expect his duties to end, so far as the infant is concerned, after it has been washed and dressed, with the possible exception of the care of the cord. (4) If the obstetrician does care for the infant as well as the mother up to the time that the mother's convalescence is completed, he should recommend that the infant be then put in the care of a pediatrician.

THE VALUE OF SYSTEMATIC PRENATAL CARE OF THE PARTURIENT WOMAN

Dr. Ralph Lobenstine stated that prenatal care to be of real value must be systematic, intelligent and untiring. The whole scheme of prenatal care must begin with intelligent understanding and coöperation on the part of the expectant mother. In order to accomplish the best results, not only must the women of the community be aroused, but the doctors themselves. In no other field of preventive medicine is there to be found a greater opportunity for accomplishing such far-reaching results, both for the individuals themselves and for the community. Prenatal care will prevent the development, or at least lessen the frequency, of many of the serious complications of pregnancy; it prevents many unnecessary maternal deaths; it better prepares the mother for labor and lessens invalidism, and, finally, it has a very deep influence upon the welfare of the infant. It is truthfully claimed that 90 per cent. of our American women are absolutely without prenatal care. Of all the progressive countries the United States is the most backward in this respect. The finest skill at the time of delivery may not, and frequently cannot, save the life of the child, or even the life of the mother, when prenatal care has been insufficient or entirely wanting. Bacon, of Chicago, estimates that annually approximately 80,000 infants lose their lives at the time of labor, or during the first two weeks postpartum, as a result of injury at the time of birth. If to these we should add those cases which die "in utero," prior to the onset of labor, from antenatal causes alone, we should have in all a probable annual loss to the country of at least 150,000 infants. To this loss must be added the great number of early miscarriages, of which we have no records, and yet which, when spontaneous, are more or less dependent on the same causative factors as are to be found in the case of non-traumatic still-births and subnormal infants. We must also reckon with the fact that our birth records and still-birth records are notoriously uncertain. According to the Children's Bureau in Washington, among all the babies dying under one month of age, nearly three-quarters die from causes operable at or before birth, and in eleven states the causes assigned as responsible for from 75 to 83 per cent. of deaths from all causes were malformation, congenital debility, premature birth and injuries at birth. Actual death is one thing, but what about the child that lives for awhile, or for many years, immature in body and mind, or actually deformed? These abnormal or subnormal beings are, in part, thus because of causes over which we have more or less control and in part to factors arising during pregnancy or labor over which we may at times be almost powerless. The more common antenatal causes are syphilis, alcohol, renal and cardiac diseases, sexual excess, deficiency in food supply of the mother, subnormal state of the father, as well as of the mother, at the time of conception, and bad physical environment during pregnancy. The less tangible antenatal factors are gonorrhea, heavy use of tobacco, opiates, and the complex toxemias of pregnancy. Syphilis is the greatest known destroyer of intrauterine life aside from criminal abortion. It produces approximately 90 per cent. macerated fetuses, and of the actual syphilitic births at or near term over 90 per cent. are still-born. Together with gonorrhea it is responsible for over 50 per cent. of spontaneous abortions and premature interruptions of pregnancy. Aside from this great destruction of intrauterine life, there is, in addition, a high infant mortality during the early weeks of life. But a comparatively small number of such children reach the years of adolescence. Gonorrhea in pregnant women should always be considered a serious complication.

The principal action of alcohol on the fetus is shown in the distressingly high tendency to nervous disorders both of the brain and spinal cord, as well as to many other features of degeneracy. Alcohol has a tendency to interfere with the normal progress of pregnancy, either by its direct effect upon the fetus, or by means of its action on the placenta. Aside from the fact that it increases intrauterine mortality, it so interferes with the resistance of the offspring that many of these die at an early age.

The toxemias of pregnancy, whether of the convulsive or non-convulsive type, have a strong influence for evil upon the fetus. The fetal mortality rate in the severe cases is high, and a very considerable number of infants that are born at or near term, apparently well, do not thrive. They lose ground the first two or three days, or they may show nothing abnormal for several days, and then suddenly die or fail very rapidly, with or without the development of convulsions. These infants may early develop a tendency to hemorrhages. The severe cases are usually difficult to manage and are usually fatal. The effects of the low-grade toxemias of pregnancy have received far too little attention from the obstetric attendant; they are too often responsible for conditions of malnutrition, acidosis and hemorrhagic disease in the infant to be overlooked.

The evil affects of over-fatigue, particularly when often repeated, are well known, but commonly disregarded. Freedom from anxiety and overwork, particularly during the last six weeks of pregnancy, not only assists the parturient herself, but reacts in a most gratifying manner on the offspring.

The ultimate blame for the high mortality in both mother and child is to be explained by the following conditions: Ignorance and indifference on the part of a large section of the community in matters concerning parturition, poverty, with its perplexing problems, insufficient obstetric training of the physician, the mid-wife question, lack of prenatal care.

The remedy is: (1) publicity without exaggeration, (2) general improvement in social conditions, (3) the elimination of the mid-wife. This cannot be satisfactorily accomplished at the present time, but we should work with this end in view. In the meantime an adequate, practical plan should be developed in order to offer to these poor patients safer medical attention, greater hospital facilities, and more adequate home nursing. Rational legislation will accomplish much and ever closer coöperation between milk stations, prenatal clinics, social workers, doctors and mid-wives will gradually place the latter in their proper sphere, namely, that of trained obstetric attendants.

The disheartening conditions found among doctors practicing obstetrics in this class of the community are due to circumstances brought about partly by faulty training and partly by sociologic conditions. It is a singular fact that so much time is devoted in our medical schools and hospitals to general surgery and so little to practical obstetrics. The former the young graduate will need to a minor degree only, the latter to a much greater degree. It is strange indeed that so few of our fine general hospitals are willing to receive confinement cases within their walls. They seem to regard obstetric cases more or less as a nuisance, and do not appreciate the importance to the community of the proper care of these patients. We need more hospital facilities for the care of obstetrical patients. In New York at the present time approximately one-tenth of the maternity cases are handled by the indoor or outdoor services of hospitals.

The best solution of the care of maternity cases in their homes may prove to be some form of industrial insurance, such as is being carried out, for example, by the Metropolitan Life Insurance Company.

ACCIDENTS AND DISEASES OF THE EARLY WEEKS

Dr. L. E. La Fétra read this paper. (See p. 401.)

OBSERVATIONS ON CONDITIONS IN THE NEWBORN, WITH SPECIAL REFERENCE TO THE COMPARATIVE VALUE IN METHODS OF TREATING THE UMBILICAL STUMP

Dr. John O. Polak said that it was through the navel cord that the majority of the infections of the newborn child took place. To be accepted as satisfactory any method of treating the navel cord must show improved morbidity records on the following points: (1) The temperature of the child during the dessication period; (2) the degree of icterus and the time of its disappearance; (3) the day on which the slough separates; (4) the condition of the stump after separation; (5) the frequency with which hernia follows, and, finally, the influence which the particular method has upon the body weight of the fetus.

At the Long Island College Hospital during the past five years, with the assistance of Dr. Hefter and Dr. Beck, Dr. Polak had given four methods a trial. It is their custom to wait until the pulsation in the cord ceases, at a distance of 15 cm. from the fetus, before clamping the cord. In their first series they cut the cord at a distance of 7 or 8 centimeters from the umbilicus, tied it near its distal end and then turned the cord over and tied it a second time, proximal to the first ligature, with the ends of the one placed at the distal end. The loop of the cord thus made, after being wrapped in gauze soaked in alcohol, was laid over the left side of the infant's abdomen, and a belly-band sewed on. The baby was not given a full bath until the cord had dropped off, and a sterile gauze and alcohol dressing was renewed every day or so. Later they employed the single ligature of the cord. After stripping the cord of Wharton's jelly a ligature of narrow tape was applied at a distance of 2½ centimeters from the navel. A sterile dressing moistened with alcohol was also used in this series. Later they employed the following method, suggested by Dickinson: The cord is clamped at birth and cord and clamp wrapped in sterile gauze until the obstetrician has attended to the needs of the mother. After donning fresh gloves an incision is made through the amniotic covering at the skin margin, and the vessels isolated and ligated with fine iodized catgut. The cord is then cut away distal to the ligature, the vessels allowed to retract, and the skin margin closed with sutures. A sterile dressing completes the operation and the binder is sewn on. This method, while ideal as a surgical procedure, opens up too many possibilities to trust to an interne for its performance. Since last June Dr. Polak said they had modified this method in the following way: The cord is clamped at the birth of the child at any point from 5 to 10 centimeters from the navel, and with forceps attached and wrapped in sterile gauze the child is put aside until the mother is cared for. The child, wrapped in a sterile towel, is then put upon the table, the clamp removed, and with sterile gloved hands the cord is stripped of its jelly and a fine-nosed Kelly clamp is placed on the cord at the amniotic junction, after first being assured of the absence of any navel-cord hernia. This clamp compresses the cord, expresses Wharton's jelly from the area to be ligated, and gently crushes the vessels. When this is removed an iodized catgut ligature is firmly tied in the crease thus made and the cord cut away with a knife just distal to the ligated vessels. An alcohol dressing is then applied and the binder sewn on. This is not disturbed until it becomes soiled, when it is replaced by a similar dressing.

Dr. Polak then presented a comparative table comprising data with reference to 176 cases treated by the new method and 125 by the old. In the method suggested by Dr. Dickinson one has an ideal surgical procedure, yet the slightest defect in technique vitiated its purpose and exposed the little patient to infection. In the last method we have a similar procedure which, according to our data, gives as good results as the Dickinson method. In 176 cases the cord dropped off between the third and fifth day; there was no sloughing mass, or excessive granulations as compared with 21 cases in a series of 125 by the old method; the resulting ulcer healed promptly, infection has been absent, icterus has been markedly diminished, and the regain of the birth weight has been uniformly more rapid than when a large mass of navel string has been allowed to slough. Theoretically, there should be fewer herniæ, as the umbilical opening is not kept patent by a granulating mass of tissue.

The mouth of the newborn is another avenue of infection. The epithelium of the mouth and buccal cavity is the infant's sole protection against infective processes. Why, therefore, should it be removed by the over-diligent nurse who attempts to cleanse the mouth of mucus with a gauze-covered finger. The primary inspired mucus may be gotten rid of by inversion of the child, and stroking of the thorax and neck from the abdomen toward the head, or by aspiration with a catheter, much more efficiently than by attempting to remove it with the gauze finger. For nearly two years we have discarded washing the baby's mouth before and after nursing, depending wholly upon a sterile nipple to safeguard both the mother and the child from infection. As a result of this there has been a marked diminution in the occurrence of thrush, our babies have nursed better, and breast infection has become almost a curiosity.

With reference to hemophilia, we have found that a systematic daily examination of every infant's stool by our resident physician has been able to disclose the first signs of blood, and we feel that not a few babies' lives have been saved by this daily inspection. With the first appearance of blood a whole blood injection from the mother is given subcutaneously into the fetus, preferably in the region of the back. In severe cases of hemorrhage we have found the combination of mother's blood subcutaneously, given in 10 c.c. doses three or four times daily, with transfusion of the infant, by injecting blood through the anterior fontanel into the longitudinal sinus, has been life-saving.

While all are agreed as to the efficiency of Credé's method as a prophylactic against gonococcic conjunctivitis, experimentation with silver protargol and argyrol solutions has shown us that we can get as good protection, without the dangers of ulcer and opacity, by employing a 25 per cent. argyrol solution in each eye at birth.

CARE AND FEEDING DURING THE FIRST MONTH

Dr. Godfrey R. Pisek read this paper. (See p. 413,)

REMARKS ON THE OCCURRENCE OF SYPHILIS IN MOTHER AND INFANT

Dr. J. R. Losee said that there were many theories on the transmission of syphilis from the parents to the offspring, but for the present it was necessary to reason from the history and clinical findings. Many men who had had syphilis and who were very thoroughly or only partially treated, married and had healthy children; on the other hand, the wives of men under the same conditions of treatment and in apparent good health, gave birth to macerated fetuses and syphilitic children. There was no definite means by which a parent subject to latent syphilis could be assured that all his children would be born free from any manifestations of the disease.

The paternal theory, namely, that the spermatic fluid affected the ovum which went on to the development of a fetus, which in turn affected the mother, seems hardly possible. There is no doubt that several cases of pure spermatic infection have occurred, as many women have been infected directly after marriage and conception has occurred simultaneously. The maternal theory, namely, that the mother is infected primarily and the fetus secondarily, is quite probable and very easy to explain. The fact that a patient denies having had symptoms of primary or secondary syphilis, when questioned after being delivered of a macerated fetus and has a positive Wassermann reaction, does not prove that syphilis was not present some time before or during pregnancy. As most of the still-births from syphilis take place in the latter months of pregnancy, it is fair to assume that the fetus is infected from the mother through the placenta, but whether the placenta can transmit spirochetes without showing pathologic evidence of it is an unanswered question.

A consideration of the effect of syphilis on the offspring includes both the transmission of the infection in its active form, in which the fetus either dies in utero or is alive and develops symptoms during the first year, and the transmission of the latent form of the disease, in which the child is normal in every respect at birth and during the first year, but develops typical syphilitic lesions later in life. Comparatively few infants born of syphilitic parents go through life without at some time presenting symptoms of the disease.

Maternal syphilis has always been considered to play a considerable part in the etiology of abortion, macerated fetuses, premature births and still-births, but it is fair to assume that the same etiologic factors were present which have been said to cause abortions in non-specific women. Intrauterine death of the fetus from the sixth month to term has long been known to be due in most instances to syphilis, and 35 to 40 per cent. of still-born children are due to syphilis. In the past year, of 27 women who were delivered of macerated fetuses at the Lying-In Hospital, 9 gave a positive Wassermann reaction. Syphilis has been held responsible many times for the intrapartum death of the infant, but the mechanical conditions which sometimes occur during delivery and which cause asphyxia would have to be excluded before syphilis could be regarded as the sole etiologic factor. Boardman says that two-thirds of all syphilitic children are born about the eighth month, but at the Lying-In Hospital, in a series of 106 mothers with positive Wassermann reactions, there were 31 living babies delivered at term; this might appear to be rather a large proportion of syphilitic children to reach term, but some of the mothers had received antiluetic treatment during the last three months of gestation.

Only about 28 per cent. of children born syphilitic survive the first year. The Wassermann reaction is valuable in making a diagnosis in a doubtful case of syphilis of the infant, four plus meaning but one thing. There have been many negative reactions on infants whose syphilitic mothers have received considerable treatment; spirochetes may be sufficient in number and virulence to produce symptoms in the infant and at the same time not produce enough antibodies in the blood serum of the mothers to give a positive Wassermann reaction.

Judging from the results of the Wassermann test, syphilis has little or no part in the etiology of fetal anomalies.

In the last two years at the Lying-In Hospital the sera of 2,049 patients were examined and 64, or 3.05 per cent., gave positive Wassermann reactions. This gives one a fair conception of the extent of the disease among women at the child-bearing age, the majority of whom lived on the lower East Side of the city. The successful results in the treatment of pregnant women, estimated by the number of children which were born with or without symptoms, depends on the amount of treatment the patient receives during pregnancy. It was believed that salvarsan could be given in moderate doses, at intervals of a few days, without danger to the fetus or premature labor, but that large doses were dangerous. There was considerable difference of opinion among observers as to whether salvarsan given intravenously to the mother was transmitted to the fetus. Of 10 cases treated during pregnancy, 5 received arsenic and mercury from the second month to term; 3 gave birth to living babies without symptoms and with a negative Wassermann reaction; 1, who was in the active secondary stage throughout her entire pregnancy, was delivered of a living baby without symptoms, but with a positive Wassermann, and 1 was delivered of a macerated fetus at seven months. Of the 5 cases which received treatment from the seventh month to term, 5 living babies were delivered and 3 gave positive Wassermann reactions.

DISCUSSION ON SYMPOSIUM OF THE CARE OF THE NEWBORN INFANT

DR. HENRY KOPLIK: It is very difficult in the presence of the enormous amount of material that has been brought to our attention this evening and the vast extent of the ground that has been covered to do any justice to the various subjects in a brief discussion; we can only take up points that have been of interest to us individually.

In a large metropolitan city like New York it is astonishing how little is done for the newborn infant in the maternity hospitals, especially in view of the vast sums of money that have been put into these institutions, for some of them are very beautiful, and no facility has been omitted that would contribute to the care of the mother, yet very secondary care is given the infant. I do not wish to criticise too strongly, but in some hospitals of secondary magnitude a considerable number of infants are kept in a small room tucked against the side of the wall in structures something like waste-baskets. In one large hospital 40 infants were cared for in one ward, and it was very difficult to get between the cribs. In another hospital there were 10 or 12 babies cared for by a single nurse and she was expected to attend to all the wants of all these infants. Fully 30 per cent. of the infants below three months of age die in the first month of life, so that it is highly important to give attention to the infants in these hospitals. There is little excuse for sepsis in a modern hospital, yet I should blush to tell how many cases of sepsis I have seen in these institutions.

Again, there is little excuse for artificial feeding in a modern hospital. It is painful to see the large number of babies on the bottle, since it seems that mother's milk could be obtained from other sources if the mother is unable to nurse her own baby.

So far as my experience is concerned, though perhaps I should not speak too definitely, since most of my work is consultation work, with reference to hemorrhage and sepsis in the newborn, the greatest number of cases of illness and death are due to sepsis and accidents in feeding. These instances of sepsis may occur in infants with inanition, going on to hemorrhage and showing other signs of infection. In many hospitals they still rely upon primitive methods in dealing with hemorrhage and melena. I was recently called to see a case of hemorrhage in a newborn infant. The baby was almost exsanguinated and very weak and was suffering from melena. I advised transfusion at once. Instead, they administered sera subcutaneously because they did not have the facilities for doing a blood transfusion. On finding the first traces of blood the thing of primary importance is not merely to stop the hemorrhage, but to place the child in such a condition of resistance that he may be able to combat other troubles.

I would make a plea not only for more room and better facilities for the care of the newborn in our hospitals, but also that the staffs of maternity hospitals should have special physicians to take charge of the newborn and to give these babies the benefits of modern progress in pediatrics. This is not a forensic criticism, but merely a suggestion to further the end desired by all of us, the lowering of infant mortality and guarding of the health of the newborn infant as well as that of the mother.

A great deal has been said with reference to antenatal care, but I do not think that much can be done in this direction unless we can obtain the coöperation of the fathers as well as that of the mothers. The father must appreciate the necessity of these things, and we can do more by getting the coöperation of the whole family than by simply trying to take care of the mother and unborn infant alone.

Dr. Edwin B. Cragin said that as an obstetrician he would acknowledge that they were under great obligations to the pediatricians, but he would also like to call attention to the fact that if it were not for the skill of the obstetrician the pediatrician would not have so many babies to care for, so that it seemed to him that the pediatrician was also under great obligations to the obstetrician.

To judge from the first paper it would seem that the obstetrician was unfit to care for the baby during the first month, but if the obstetrician has eyes and ears and is a keen observer, and if he watches the woman carefully through her pregnancy, and has the opportunity of studying from fifteen to eighteen hundred babies a year, and is any sort of a man, he must learn quite a little about the care and feeding of the newborn infant.

Dr. Koplik acknowledged that he has seen these maternity institutions mostly from the outside; if he had made the rounds of the wards he would have found that the babies were given due consideration and he would have found that even the "waste baskets" on the walls have their advantages. They can be taken off the walls when the beds are to be made up and can be separated so as to avoid infection of one baby from another. Dr. Cragin said he did not think the properly trained obstetrician should be regarded as an incompetent caretaker of a baby during the first month.

Many women, much to their regret, cannot nurse their babies. At the Sloane Maternity they cannot get enough breast milk. This may be due to the nervous strain and high tension of modern life, but whatever its cause, the fact remains that fewer mothers are able to nurse their babies than ten years ago. At the Sloane Maternity breast milk is used as far as possible, but it is difficult to borrow and expensive to buy. A mother is not always willing to give her milk to a baby not her own, claiming that her breast milk belongs to her own baby, and what can be bought is usually taken for private patients and cannot be used for ward patients.

Dr. Polak, in his paper, spoke of having dispensed with the practice of swabbing the babies' mouths. For a number of years at the Sloane Maternity the nurses have not been allowed to swab the babies' mouths either in the delivery room or before or after nursing. Less than a month ago the head nurse complained that they were having more cases of thrush than they ought to have, and now the nurses were allowed to cleanse the mouths of the babies with sterile cotton and boric solution once a day, at the time of the bath. This is simply an instance of one of those practices which we discard and then go back to later on. As to the duty of the obstetric hospital to-day to the mother, the baby and to the pediatrician, Dr. Cragin said that we are all working for the same thing, namely, a higher standard in the care of the baby, as had been brought out to-night. We must get the mothers early and surround them with every possible care. No hospital is doing its duty to-day unless it is giving this early care. A Wassermann test should be made in the case of every patient early in the course of pregnancy, both for the welfare of the mother and that of the baby. Moreover, it is of great interest to the hospital, because a baby apparently healthy at birth may be sent out of the hospital and then given to a foster mother and give that foster mother syphilis; hence the making of the Wassermann test is extremely important. Having followed the woman during her pregnancy, and having seen her safely through the puerperium, it is then our duty to put the mother and baby in touch with the proper welfare agency or pediatrician so that proper care may be insured after the baby leaves the institution.

TONSILLECTOMY AS A THERAPEUTIC MEASURE IN THE TREATMENT OF CHOREA AND ENDOCARDITIS—Analyzing observations made in the Children's Medical Department of the Massachusetts General Hospital, J. H. Young (Boston Medical and Surgical Journal, 1915, Vol. CLXXIII., p. 356) says that definite conclusions cannot be drawn from few cases; the occurrence of chorea after tonsillectomy in 12 out of 21 cases strongly suggests that removal of the tonsils does not offer the protection against chorea, and the always present possibility of endocarditis, that many have heretofore believed.—*The American Journal of Obstetrics.*

THE PHILADELPHIA PEDIATRIC SOCIETY

Stated Meeting, Held March 14, 1916

PRESIDENT JOHN F. SINCLAIR, M.D., IN THE CHAIR

DR. H. BROOKER MILLS and DR. GEORGE A. SOWELL showed a case of pyelocystitis and metastatic abscesses, following tonsillitis. The case was a two-year-old male child, taken ill on December 9, 1915, with tonsillitis, from which it recovered in three days. On December 16, the child had a sudden rise in temperature to 103°. Fever continued for several days and then dropped to normal for several days, when it suddenly rose again. On December 27th, the patient was admitted to the Samaritan Hospital, where the physical examination was found to be negative, except for some swelling on the instep of the left foot, at the metatarso-phalangeal joint of the right big toe, and the dorsal surface of the left hand. All of these swellings subsequently developed into abscesses, which were opened and drained a few days later.

Examination of urine at this time showed albumin, many pus cells, and a few red blood cells, but no casts. The leukocytes were 18,000, with 72 per cent. of polynuclear cells.

The Widal and paratyphoid tests were negative. Staphylococcus albus was obtained from the pus from the abscesses, from the urine, from the blood cultures, and from the tonsils when they were removed.

Dr. Mills and Dr. Sowell felt it was proven pretty conclusively that the tonsillitis was in part, if not entirely, the etiologic factor in producing the pyelocystitis, while the metastatic abscesses were complications of the latter.

DR. WILLIAM N. BRADLEY showed some composite weight charts of breast-fed, partially breast-fed and bottle-fed babies. These babies were all weighed undressed, on a scale which could be accurately balanced to a quarter of an ounce. The charts represented all the babies under one year, cared for from October 1, 1914, to October 1, 1915. No allowance was made for illness, such as colds, coryza, bronchitis, pneumonia or diarrhea, nor for any cases of chronic diseases. In other words they were not selected cases.

The artificial feedings prescribed for these babies were all diluted milk, with malt sugar, and were given in such strength and quantity as suited the needs of the individual baby. They all had ignorant mothers, 90 per cent. of whom were Italians; therefore simple mixtures were necessarily prescribed, as teaching complicated home modification in these instances would be absolutely impossible. These cases were all followed up very systematically by nurses, who visited the home usually once a week.

The curves were made from the individual charts of all the babies coming to the Starr Center. All those of the same age were averaged in order to construct the composite curve, and they were compared with the normal weight curve suggested by Dr. J. P. Crozier Griffith.

There were 417 babies entirely breast-fed, 146 bottle-fed, and 87 partly breast and partly bottle-fed. In studying the charts it was noticed that the breast-fed babies corresponded with the normal curve from six to nine months and then averaged a somewhat higher weight than normal, but at about eleven months failed to gain on breast milk alone. Dr. Bradley considered that this was quite conclusive evidence that at this time they should be started on supplementary foods. Entirely bottle-fed babies did not come up to the normal weight until the eleventh month. Partly breast and partly bottle-fed babies reached normal at about eight months.

In 1912 they found that only 48½ per cent. of the babies were breast-fed. By doing everything possible to induce the mothers to prolong breast feeding they had succeeded in two years in raising this to 73 per cent.

Dr. Bradley, in answer to questions by Drs. Rostow, Cornell, Gittings, Hill and Jenks, said that these figures were absolutely correct. They showed what could be done in the way of decreasing mortality and increasing the percentage of breast-fed babies. These cases were all very carefully followed up by the Social Service Department. They were required to come to the dispensary every week and were visited at home by a nurse once a week. Every case was followed so closely that the end result was always known.

Dr. Alfred Gordon read a paper on "The Value of the Wassermann Test in Mentally Deficient Children." Study of 78 cases. (See page 273, Archives of Pediatrics, April, 1916.)

Dr. Maurice Ostheimer read a paper on "Scarlet Fever in Philadelphia During 1915." He stated that 1,072 cases of scarlet fever had been reported to the Health authorities in 1915, 100 more than one-half the number reported during 1914 (1,944), and less than a third as many as in 1913 (3,400). This is a morbidity rate of 64 per 100,000 as compared with 117 in 1914 and 208 in 1913. August, 1915, had only 29 cases; December, 147 cases. Of the 1,072 cases, 529 were male (513 boys) and 542 female (501 girls). This leaves only 58 adults who contracted scarlet fever during 1915; 75 per cent. of cases were reported to the Health authorities within three days of illness; 90 per cent. within five days.

DISTRIBUTION OF SCARLET FEVER BY DISTRICTS, 1915

Central Philadelphia, 6 wards	27	cases, or	4.5	per ward
Frankford, 3 large wards	21	" "	7	" "
North Philadelphia, 21 congested wards	439	" "	21	" "
West Philadelphia, 6 large wards	160	" "	27	" "
South Philadelphia, 9 congested wards	282	" "	31	" "
Germantown, 3 large wards	143	" "	48	" "

Scarlet fever cases removed to hospital	625	(58.3 %)
Deaths in hospital	21	(3.4 %)
Scarlet fever cases treated at home	447	(41.7 %)
Deaths at home	5	(1.1 %)

Secondary Cases of Scarlet Fever

When primary case remained at home	117	(10.9 %)
When primary case in hospital	31	(2.9 %)
Hospital return cases	33	(3.1 %)
Late secondary cases	3	(0.28%)
Total secondary cases	184	(17.18%)
Contact known in school	100	(9.3 %)
Contact known elsewhere	117	(10.9 %)
Total cases with known contact	401	(37.4 %)

Isolation in Scarlet Fever

Good, with trained nurse	112	(10.4 %)
One person nurse, another housekeeper	279	(26.1 %)
Same person nurse and housekeeper	681	(63.5 %)

The last figures include most of those cases which later were removed to the hospital.

Scarlet fever during 1915 was remarkable for the following reasons:

(1) The lowest number of cases reported during any one year since 1900, when accurate statistics were first begun, 1,072 cases.

(2) The lowest number of cases removed to the hospital during any one year, 447 cases.

(3) The lowest number of deaths from scarlet fever during any one year, 26 deaths, 2.4 per cent.

(4) The lowest death-rate per 100,000 during any one year, 1.5.

(5) The lowest number of deaths occurring in the hospital during any one year, 21 deaths, 3.3 per cent.

(6) The lowest number of deaths occurring among cases treated at home during any one year, 5 deaths, 1.1 per cent.

DR. JAMES MCKEE said that he understood from the paper that there were more cases in the sparsely settled than in the densely settled parts of Philadelphia. Dr. McKee also spoke of an epidemic which had been carried through a milk route. The driver of this milk route had a child suffering with scarlet fever.

DR. ALFRED HAND said that the figures of Dr. Ostheimer gave a certain amount of encouragement, although it will take a number of years to really affect the prevention of contagious diseases. There is certainly a much lower death rate than there used to be of scarlet fever. Dr. Hand said that he had occasion to look up statistics of scarlet fever and he had found that in previous years at times the number of deaths from scarlet fever was more than the total number of cases for the present year.

DR. WILLIAM BRADLEY thought that pasteurizing would do much to diminish the number of cases of scarlet fever and this had been proven in one of the wards of the city.

DR. MYER SOLIS COHEN said that a great many cases of mild scarlet fever were not reported. Many cases were supposed to be measles and afterward found to be scarlet fever. It is often difficult to find the original source of the epidemic.

DR. PAUL CASSIDY said that it was his opinion that the reason that the suburbs and more prosperous sections of the city showed more scarlet fever than some of the densely populated sections was because there was among the wealthier class more carelessness and they would not allow their children to be sent to the Municipal Hospital.

Dr. Walter Cornell quoted an article, which had appeared several years ago, which seemed to prove that contagion did not bear upon the density of population.

Dr. Philip Marvel cited an instance which had occurred in Germantown. The mother of a child who was ill was a Christian Scientist. The child being quite ill, she could not reconcile herself to call in a real doctor, so she called in an osteopath. This child shortly afterward was sent back to school cured. From this case 12 other cases developed scarlet fever. The epidemic was traced to its source and the osteopath, being questioned, very frankly admitted that he never had a case of scarlet fever before and had no idea what ailed the child. Dr. Marvel also told of an instance in which an epidemic of scarlet fever had been traced directly to a dairyman, whose daughter was suffering with the disease.

Humanized Milk in Infant Feeding—As a useful food for the average healthy infant who is under the care of the busy general practitioner, J. Epstein (Medical Record, May 29, 1915) recommends the use of the upper 15 ounces of a quart bottle of milk diluted with an equal amount of water. So diluted and with sugar added to make 7 per cent., it has the following percentage composition: Protein, 1.70; sugar, 7; fat, 4; salts, 0.35; water, 86.95. This corresponds quite closely with the composition of human milk, which is: Protein, 1.50; sugar, 7; fat, 4; salts, 0.20; water, 87.30. Having decided by the weight, age and general condition of the infant how many ounces of food it requires at each feeding and the number of feedings in twenty-four hours, the mother is directed to use the upper 15 ounces of 1 or 2 quart bottles of certified raw milk, and out of these 15 or 30 ounces of milk she takes as many ounces as she is directed, and to this she adds an equal number of ounces of cooled boiled water, to which the proper amount of milk sugar has been previously added. The entire quantity of food, which is made up of half milk, half water, and sugar, is now equally divided into the number of feedings required and fed at regular hours.—*The American Journal of Obstetrics.*

DEPARTMENT OF ABSTRACTS

Original Condensations of Current Pediatric Literature
by the Editors and the Following Associates

Charles E. Farr	New York City
Morris Friedson	New York City
Gaylord W. Graves	New York City
Howard K. Hill	Philadelphia, Penna.
Jerome S. Leopold	New York City
William Lyon	Jackson, Mich.
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Samuel W. Thurber	New York City
Eugene F. Warner	St. Paul, Minn.
Edwin T. Wyman	Boston, Mass.
J. Herbert Young	Newton, Mass.

Eisendrath, D. N., and Strauss, A. M.: The Acute Abdomen in Children. (Illinois Medical Journal, April, 1915, p. 273.)

The authors give a classification of the lesions which produce an "acute abdomen" between birth and fifteen years of age. These are illustrated by suitable cases.

(1) Appendix. (*a*) Inflammation of an appendix attached to a fully rotated cecum. (*b*) Inflammation of an appendix which is attached to a cecum unrotated; lies just below the liver. (*c*) Inflammation of an appendix complicated by an ileus, due to a kinking of the terminal ileum. (*d*) Acute tuberculous infection of the appendix simulating an ordinary acute pyogenic infection. (*e*) Acute inflammation of the lymph glands lying along the iliac vessels. (*f*) Subphrenic abscess complicating an appendicitis.

(2) Acute affections of the liver. (*a*) Abscess of (rare). (*b*) Acute cholecystitis and cholelithiasis (16 cases reported).

(3) Acute infections of the intestines. (*a*) Obstructions due to an intussusception (most frequently). (*b*) Persistent Meckel's diverticulum (rare). (*c*) Kinking of coil around an acutely inflamed appendix. (*d*) Strangulated hernia (rare).

(4) Acute infections of the peritoneum. (*a*) Acute pyogenic inflammation secondary to appendicitis, inflammation of Meckel's diverticulum, or a gangrene of an ovarian cyst following a twist of its pedicle. (*b*) Acute tuberculous peritonitis.

They advise that the following must be thought of: infection of the kidney, urethral calculi, referred pains from pleurisy or from tuberculous spondylitis, twisted ovarian cyst, oophoritis following mumps, acute septic salpingitis of little girls, inflammation of the intra-abdominal portion of the vas deferens in mumps, and inflammation or torsion of an undescended testicle.

From their observations the authors believe that the younger the child the less marked the pain and tenderness, the vomiting and the rigidity of the abdomen. Except in intussusception, tympany is marked. A blood count of 11,000 may mean a perforated appendix, while one of 40,000 may mean only an injected appendix. The temperature should be taken by rectum. Pathologic changes appear about four times more rapidly in children than in adults. C. E. F.

FRIEDENWALD, C. B., AND GREENFIELD, WILLIAM: TUBERCULOUS TUMORS OF THE BRAIN. (American Journal of the Diseases of Children, June, 1915, p. 508.)

Tuberculous tumors are the most common of all cerebral tumors. During childhood they form over 50 per cent. of all brain tumors. The tubercles are most commonly found in the cerebellum. The pons is the next most common site. When found in the cortex they are usually situated in the paracentral lobe. The tubercle forms about a blood vessel, caseation occurring in the center. It is sharply defined from the surrounding brain substance, which undergoes softening.

The authors report a case of a boy of seven years who, when first seen, was suffering from convulsions, epileptiform in character, which occurred at irregular intervals. These always set in with spasm of the right arm and leg. A positive Wassermann reaction was obtained and the patient placed upon active antisyphilitic treatment. Following a virulent convulsion, the patient became acutely ill, pneumonic symptoms set in and ten days later the child died. At necropsy, the right lung was found to be extensively involved and the left apex showed immense fibroid tubercles. Miliary tubercles were found on the visceral peritoneum. In the brain a number of hard, shot-like elevations about the size of marbles were felt in different portions of both cerebral hemispheres. The twitching of the hand and leg were explained by a large tumor found in the left ascending parietal convolution. The case is unique because of the great masses of tubercle bacilli found in the vessel walls and within the caliber of the vessels of the cerebral hemispheres and bronchial lymph nodes. No other case is reported of the bacilli found within the blood vessels. C. E. F.

DUNN, CHAS. H.: CONGENITAL CIRRHOSIS OF THE LIVER. (Interstate Medical Journal, January, 1916, p. 25.)

A baby three and one-half weeks old was admitted to the Infants' Home suffering from marked jaundice, distended, shiny abdomen, with prominent veins in the abdominal wall, clay-colored stools, dark urine and constipation. The patient had several severe convulsions and operation seemed advisable. An incision was made at the upper border of the right rectus muscle. The peritoneum contained large amounts of bile-stained fluid. The intestines were slightly distended. The liver was large, dark red and rough surfaced. The gall bladder was opened and drained, and a drainage tube inserted. At autopsy, no obstruction was found in the common duct or in the hepatic duct. The clinical diagnosis was congenital obliteration of the bile ducts, while the autopsy revealed a congenital cirrhosis of the liver without obliteration of the bile ducts. The author states that there are two views held as to the relation of the cirrhotic process of the liver to the obliteration of the bile ducts. One regards the bile duct process as primary and considers the cirrhosis of the liver as secondary, while the other regards the process in the liver as primary, and considers that the occlusion of the bile ducts is due to an extension of this tissue reaction along the large bile ducts. In favor of this is the fact that obliteration of the extra hepatic bile ducts is never found without an accompanying cirrhosis of the liver, but, as in the present case, the same cirrhosis may be found in a liver in which the common and hepatic ducts are patulous. In this case, Dr. Councilman regards the degeneration in the liver cells as a primary condition and the connective tissue increase as secondary. The cause of this condition is unknown. The prevailing view is that the inflammatory process is due to the absorption of toxic substances from the mother. The most striking symptom is jaundice, which may be present at birth, but usually develops on the second or third day, or as late as the twelfth day. The stools soon become clay-colored, the urine is always bile-containing and the liver and spleen usually enlarged. Hemorrhage may occur. The babies lose steadily in weight and strength. Death occurs finally from inanition. Eight months is the longest recorded period of survival in this condition. The hopeless prognosis suggests surgical exploration in the hope that the condition may be due to some mechanical obstruction of the large ducts, inspissated bile or peritoneal adhesions. C. E. F.

BLOOM, CHAS. J., AND STONE, R. E.: TRAUMATIC RUPTURE OF THE LEFT KIDNEY. (American Journal of Diseases of Children, January, 1916, p. 58.)

A case of unusual interest, both because of its rarity and the absence of any symptoms of traumatic rupture of the left kidney, is reported by Drs. Bloom and Stone. The patient, a girl of eleven years, fell from a wagon, the distance of 3½ feet. She was unconscious for a few minutes, then complained of pain in her stomach, and fifteen minutes later vomited. Later she "voided a black urine." The following morning she complained of a frequent desire to urinate and of a drawing-down pain in the region of the stomach, radiating to the vicinity of the kidney. Physical examination showed some degree of tympanites and a slight sensitiveness to touch. There was no other manifestation of traumatism, except a temperature of 102°, a pulse of 136 and respiration of 34. In the urine a few hyalin casts were present, with a few blood cells and some pus cells. On operation, a large, firmly-organized hematoma was found. The kidney was lacerated at the lower pole and also about three inches above. The capsule was completely torn. The kidney was not sutured. A cigarette drain was inserted and the wound closed. The child recovered.

In the usual traumatic injuries of the kidney the symptoms present are: pain in the lumbar region, particularly in the costovertebral region, often radiating along the ureter to the vicinity of the bladder; pronounced shock, and hematuria of a varying degree. In this case there was no tumor mass. According to Tuffier, the injury in this case was one of the third degree, in which there was an extra renal hemorrhage, with two deep multiple stellate fissures of the kidney substance, most pronounced below the hilum. C. E. F.

BARTON, E. A.: THE CONDITION OF THE LARYNX AND TRACHEA IN THE STILLBORN INFANT AND ITS BEARING ON ARTIFICIAL RESPIRATION. (Journal of Obstetrics and Gynecology of the British Empire, May, 1915, p. 138.)

The trachea at birth is a closed tube and the first respiration converts a potential into an actual lumen. On postmortem examination of a number of stillborn children, in whom no air has passed the glottis, the author finds that for about one-third inch below the glottis, which is invariably closed, the trachea is open.

narrowing like a funnel until the point is reached where the lumen is entirely obliterated by the folding in of the cartilaginous rings behind. The muscular posterior wall of the trachea is folded in such a manner that, by its contraction, the infolded cartilage ends would be separated, and an actual lumen be formed from a potential one. The ribs before the first breath are under an outward elastic tension, tending to expand the chest and aiding the completeness of the first inspiration. The first inspiration of life is a very complicated process. The glottis must be opened, the posterior wall of the trachea must contract to unfold the curled cartilage, converting a closed into an open tube; the ribs under outward tension spring open and air rushes into the, till now, solid lungs. The condition of the thorax of an infant before air has entered the glottis is that of a solid body, and any passive attempt, such as by Sylvester's method, to inflate the lungs until the glottis is open and the tracheal surfaces separated, is impossible. The pulling up of the arms to expand the chest has no effect on the glottis.

The author concludes that if the newborn infant has never made an attempt to breathe, and makes no effort, the glottis must be mechanically opened, either by intubation or by blowing into the child's mouth, the latter being performed with the child's nose closed. As soon as the lungs are distended any artificial respiration is easily carried out. C. E. F.

BARRINGTON-WARD, L. E.: AN UNUSUAL CALCULUS IN A CHILD. (British Journal of Surgery, 1914-15, Vol. II., p. 718.)

The patient, a girl aged six, had suffered from diarrhea for six weeks. She had complained of severe abdominal pain without vomiting. Blood and mucus were passed from the rectum. She was thought to have colitis. The urine also showed blood and mucus. The child not improving under treatment was cystoscoped by the author. A large calculus of irregular shape was found to occupy the bladder. The bladder was opened from above, and a hairpin extracted, which was completely imbedded in phosphates with only the points projecting.

The points of interest in this case are: (1) The pronounced rectal symptoms, "sympathetic" in nature. (2) The presence of this foreign body in a child of six. The pin was pushed through the urethra by the patient with the assistance of a school friend.

C. E. F.

GIBB, WISHART, D. J.: THE TONSIL OPERATION. AN INQUIRY INTO THE ACTUAL RESULTS OBTAINED IN A SERIES OF CASES. (Annals of Otology, Rhinology and Laryngology, September, 1916, p. 641.)

The author has compiled the records of 28 cases and shows ten pages of tables which cannot be reproduced in an abstract; however, certain results may be drawn which will be of interest. The cases range in age from three to fifty-two years, and up to fifteen years of age are divided about equally between the sexes. In Class 1 the age is under twelve; in Class 2 the age is between twelve and fifteen. The time since their operation averages five years. The operation was done for a number of conditions, such as tonsillitis, frequent colds, enlarged glands, voice defects, swelling and aching of the throat, ear affections, rheumatic symptoms, headache, cough, enuresis, neuralgia, chorea, endocarditis, quinsy. In Class 1 all the cases were cured except one, where a small piece of tonsil left in resulted in swollen glands seven years afterward. A like result was obtained in cases between twelve and fifteen years of age, except in one, where a deafness was not benefited. The author is convinced that the leaving behind of any part of a tonsil does no good nor did the removal of the whole gland do any harm. In 3 cases among the younger children there has been some irregularity in the palate arch resulting from contracture. The anatomic results are always better in cases where the tonsil is entirely removed, especially in the younger children. In one case the operation had a bad effect on the singing voice; in another, where there was variation in the height of the palate arch on each side, there was no effect on a good voice. In several the singing voice was much improved, even where there was some deformity of the palate from fibrous bands. The author believes that the extra capsular enucleation of the tonsil has, taken as a whole, a beneficial effect on the voice. In all cases there has followed a marked improvement in general health. S. W. T.

GREENE, CHAS. LYMAN: THE DILATED DROP HEART: A COMMON AND IMPORTANT CONDITION HITHERTO UNRECOGNIZED. (The Medical Herald, incorporating the Kansas City Medical Index-Lancet, November, 1915, p. 393.)

Dilatation without valvular insufficiency and classical signs of cardiovascular incompetence are overlooked and neglected—usually the primary and fundamental factor in an obscure and baffling ailment. Nine causes of neglect on the part of cardiopaths are given, the gist of which proves that the obscure cases of dilatation are neglected from the standpoint of proper treatment by rest and digitalis. The typical "drop heart" when undilated is described as extremely attenuated and vertical in outline, peculiarly low and median in position and almost literally a pendulous organ. Hence its name, based upon the resemblance to the hanging drop of viscous liquid. The drop heart is a part of a general asthenia, associated with abdominal and pelvic viceroptosis. If the heart measures 12 to 13 cm. in its transverse diameter and the viceroptotic signs are evident it is ground for assuming that there is a decided degree of dilatation. Drop heart in an undilated state rarely measures over 9.5 cm. in total transverse diameter and may yield but 7.5 cm. Subjective symptoms often ascribed to a neurasthenic condition or hysteria are generally present. Air hunger in a mild degree is usually present. Subjective fatigue and exhaustion and genuine lack of physical or psychic endurance often constitute a major complaint. The vasomotor system is labile and the nutritional balance peculiarly unstable. The pulse is usually small, soft and more or less labile. Blood pressure is seldom raised, nor is it ordinarily low, though in certain instances, systolic pressures running well below 100 are obtained. Heart pang and angina pectoris in miniature are quite common. Dull precordial pain or distinct discomfort with an area of tenderness largely confined to the lower left border and the region of the apex are commonly present. Murmurs when found are generally of the functional type, rarely transmitted, but oftener soft and localized or represent mere murmurishness or blurring of the tone. These murmurs are more or less strictly and suggestively limited to the classic areas of maximum audibility for the pulmonary and mitral valves.

The article is summarized under two heads and is well worth studying. Eight radiographs are shown of the drop heart with dotted lines to indicate the normal and dilated states. In conclusion the author says: Subtract demonstrable visceral lesions, incipient insanity, hyperthyroidism and thyroid insufficiency, larval syphilis, and, above all, chronic congenital asthenia, and nothing of neurasthenia remains. E. F. W.

Downes, William A.: The Operative Treatment of Pyloric Obstruction in Infants. (Surgery, Gynecology and Obstetrics, March, 1916, p. 251.)

In the 66 cases of pyloric obstruction in children reported, all showed the characteristic tumor at the pylorus, except one case, where the obstruction was due to a small tumor of the muscularis mucosæ, projecting into and filling the lumen of the pylorus. All the cases showed the marked hypertrophy of the band of circular fibers, with the redundant and thickened mucous membrane lying in longitudinal folds. Most of the stomachs were of normal size. Edema of the pylorus and of the pyloric region was present in all cases.

The author believes that true malformation is present at birth, consisting of an abnormal thickening of the circular muscle of the pylorus, and that the effort necessary to force food through the narrowed and elongated pyloric lumen produces circulatory disturbances resulting in edema. As the amount of food and the muscular effort are increased, the lumen narrows down until about the tenth day obstruction occurs. The symptoms of this condition are projectile vomiting, tumor, peristaltic waves, gastric retention and rapid loss of weight. Marked constipation is usually present. The tumor, which varies in size from the terminal phalanx of the little finger to that of the thumb, is pathognomonic of the disease. A light anesthesia may be necessary to feel it. Under the most favorable conditions with medical treatment the result is always in doubt. Operation seems the rational procedure.

In posterior gastroenterostomies, the mortality in the author's cases has been 35 per cent. In his partial pyloroplasties the mortality has been 23 per cent. The operation of posterogastroenterostomy consumes from twenty-five to forty-five minutes, while the partial pyloroplasty takes from ten to twenty minutes.

In the Rammstedt operation of partial pyloroplasty, the pyloric tumor is held between the thumb and the index finger and a longitudinal incision from 2 to 3 cm. in length is made through the serosa. The hypertrophied muscle fibers of the pylorus are cut down to the thickened mucosa. When the muscle is sufficiently divided the liberated mucous membrane protrudes freely into the wound. The tumor is dropped back into the abdomen and the wound closed. Formerly the author passed a No. 20

sound through an incision in the stomach wall. This was passed through the pylorus after the nicking of the muscle to see if the pylorus was patent. This step has now been abandoned, as it seemed to increase the chance of a peritonitis.

The author concludes that the partial pyloroplasty is the operation of choice. It takes less time, is more simple, feeding is begun earlier, post-operative vomiting is less and late complications such as diarrhea and vomiting do not occur. C. E. F.

MILLS, H. BROOKS: HEMORRHAGES IN CHILDREN. (American Journal of Obstetrics, December, 1915, p. 1,096.)

In the majority of instances the bleeding in children is likely to be a slight oozing, traumatic and local in character. In the newborn certain diatheses which have hemorrhage as a symptom, such as Buhl's disease, Winckel's disease, syphilis and melena neonatorum, may be present, but are rare. Buhl's disease occurs in apparently healthy infants, its symptoms being vomiting, cyanosis, jaundice and hemorrhage. Its treatment is symptomatic. At autopsy multiple hemorrhages and fatty degeneration in all the viscera are found. Winckel's disease resembles Buhl's disease, except that it is of epidemic character, has more hemorrhage and less fatty changes and is more rapidly fatal. In syphilis, the hemorrhage consists of capillary oozing from the umbilicus, nose, bowels and other organs. Cyanosis, edema and icterus are usually present. One grain of calomel or of calcium chlorid should be given every twenty-four hours. In melena neonatorum, the injection under the skin of at least an ounce of human serum, according to Welch of New York, is the best treatment.

The author finds that blood coming from the gastrointestinal tract often comes from the swallowing of blood by the child nursing from fissured nipples. Purpura is usually a symptom of toxemia following the infectious fevers, or the administration of large doses of drugs like phosphorus and antipyrin. Calcium chlorid or the use of adrenalin is often beneficial. Bleeding as a symptom of scorbutus is well known. It is pointed out by the author that a history of imperfect feeding and the joint involvement will make the diagnosis clear. This will be further verified by the improvement upon the administration of fruit juices and a proper dietary. Hemorrhage in typhoid in children is a very rare condition. Hematemesis, or vomiting of blood, is due to ulceration of the stomach. Rectal feeding should be inaugurated. Suprarenal extract in 1-grain doses hourly until the vomiting has ceased is indicated. The author urges that serum or vaccine therapy is the treatment of choice in all cases of hemorrhages. C. E. F.

LADD, WILLIAM E.: INTUSSUSCEPTION. (Boston Medical and Surgical Journal, December 9, 1915, p. 879.)

The author, from the history of cases at the Children's Hospital in Boston, states that without prompt surgical attention intussusception is one of the most fatal diseases of infancy. Prior to 1908 he cites 26 cases operated on in Boston, with 3 recoveries. In the last seven years a series of 63 cases shows 32 recoveries, a most remarkable decline in mortality. In this series of 63 cases, 4 cases were operated on at the end of twelve hours with no mortality, 18 cases were operated on at the end of twenty-four hours with 3 deaths, 13 cases came to operation at the end of thirty-six hours with 3 deaths, and 17 cases operated on at the end of sixty hours showed a mortality of 15. In this series, 49 cases occurred in the first year, 8 in the second year, and 6 were scattered from three to nine years. The condition usually occurs under two years and is found in healthy, well-nourished babies.

The author emphasizes that special attention should be paid to the mother's story. She usually gives the history of a perfectly well baby, suddenly taken with an attack of pain, turning pale and soon after vomiting. This is followed by periods of well-being, varied by attacks of pain with crying out and the drawing up of the legs. A normal looking stool is usually passed, but after five or six hours a stool is passed composed almost wholly of blood, the baby having begun to vomit and to refuse to take food. During the first twelve hours a mass is usually found in the right lower quadrant under the right costal border, in the mid-line at the level of the umbilicus, or in the left upper quadrant, according to how far the bowel has invaginated. The only time that the mass is hard to feel is when it is situated under under the costal border at the end of thirty-six hours, in the presence of marked distention. It is only after forty-eight hours that the sunken eye, the distended abdomen and the mass in the rectum appear. At operation, adhesions very rarely occur. Edema, gangrene and swelling of the mesenteric glands are the three conditions which sometimes make reduction impossible. When resection is resorted to the hope is forlorn. C. E. F.

ASHURST, A. P. C.: MULTIPLE CARTILAGINOUS EXOSTOSES. (HEREDITARY DEFORMING CHONDRODYSPLASIA.) (Annals of Surgery, February, 1916, p. 167.)

The subject of multiple cartilaginous exostoses has recently been studied by Ehrenfried, who prefers the name of hereditary deforming chondrodysplasia. He found only 12 cases which had been reported in America. It was first described by Cæsar Hawkins in 1837. Since the writer has seen as many as 11 cases in the last ten years, he feels that the affection is not really rare, but that it has been ignored because so little can be done in the way of treatment. The disease is more frequent in males than in females, is distinctly hereditary, transmitted by both affected males and females, and may be transmitted by unaffected females. The writer says that the essence of the disease is not the exostoses, but that these are merely incidental, as suggested by Ollier long before the advent of the skiagraph. The underlying pathologic change is a chondrodysplasia, affecting especially the metaphysis of the long bones. The bones of the pelvis, the clavicles, scapulæ and the vertebræ may also be affected. Leonormant describes the epiphysis as small or misshapen, the intermediary cartilage as narrow, irregular, oblique or zigzag and sometimes prematurely ossified in this disease. Clumps or nests of uncalcified cartilage cells are scattered along the ends of the shaft beneath the periosteum, which may later develop into cartilaginous exostoses or chondroma. Secondary characteristics may be present, such as shortness of the limbs, lack of growth of the ulnar, with luxation of the radius at one or both ends, and pes valgus from lack of growth of the fibula. The luxation of the radius at the elbow is often mistaken for "congenital dislocation of the radius." Exostoses may occur on undeformed bones or the deformities may come before the exostoses without the latter developing. Patients are usually seen at puberty complaining of pes valgus, painful pressure by one or more exostoses or of general bone pain.

The author gives a brief summary of 9 unpublished cases which have come under his observation. These patients vary from four years to sixty-two years in age, the average age being about fourteen years. He cites, further, 4 other cases of Drs. Davis and Taylor and 3 cases which were not typical. He gives also an example of a traumatic hyperostosis and of osteophytes accompanying chronic hypertrophic arthritis. C. E. F.

Balfour, David C.: Tonsillectomy in Children from the Standpoint of the General Surgeon. (Annals of Surgery, March, 1915, p. 257.)

Many children who have had their tonsils removed either failed to obtain relief from their symptoms or have developed local or constitutional disturbances from hypertrophied stump of tonsilar tissue later in life. It is still unsettled to what extent the tonsils should be held responsible for various forms of arthritis, lesions of the gastrointestinal tract, infections of the gall-bladder, tuberculosis, or exophthalmic goiter. But it is true that diseased tonsils are often the cause of ill health in children and in adults. Tonsillectomy is the operation of choice. Statistics from the New York public schools show that in 10 per cent. of children operated on there has been mutilation of the soft parts surrounding the tonsil. Of those operated upon without anesthesia, 90 per cent. of the operations were badly done, while 25 per cent. of those operated upon with anesthesia show poor results. Dissection properly performed will accomplish tonsillectomy in 100 per cent. of cases, while any of the modified guillotine operations prove inefficient in a varying percentage of cases. The anesthesia is important. An ideal anesthesia is one sufficient for the operation, yet light enough so that the patient is already returning to consciousness by the time that the operation is completed. Dissection causes less primary or secondary bleeding, because the removal of the entire tonsil permits the tonsillar vessels to retract into the muscular wall of the pharynx. Beekman's modification of the Waugh method has proven satisfactory in 1,654 cases operated on in the Mayo Clinic. The child lies with the head held free over the edge of a slightly lowered table. The operator stands at the head of the child between two assistants. The cranium is supported by an assistant, who stands at one side of the table. After a Whitehead mouth gag, without a tongue depressor, is fixed in place, the operator introduces his index finger behind the posterior pillar of the tonsil. By firm upward traction of the tonsil the anterior pillar is put on a stretch. The pillar is then well freed from the anterior surface of the tonsil with blunt dissecting scissors or forceps, avoiding any injury to the capsule. The supporting finger behind forces the tonsil forward and it is securely engaged with a tenaculum. The tonsil is turned to expose the posterior pillar, which is freed by blunt dissection. The superior pole is now enucleated from the superior tonsillar fossa and the tonsil may usually be rolled out with only blunt dissection.

In very adherent tonsils careful clipping with the dissecting scissors to free the tonsil entirely from the pharyngeal wall is employed. This operation permits the operator to clearly see what he is doing. C. E. F.

MORGAN, HAROLD G.: CARE OF THE NEWBORN. (The Ohio State Medical Journal, January, 1916, p. 7.)

On account of the lack of interest taken in the newborn by the average obstetrician and the lack of proper training on the part of many trained nurses, the author emphasizes the necessity for a revision of the obsolete standards that prevail at the present time. He says that after the cord has been tied by the obstetrician his responsibility in the majority of cases ceases, because the obstetrician evidently assumes that the newborn and the nurse will fight it out in some way. Like a great many pediatricians of to-day, the author rather hints that the after care of infants really should be left to a specialist and a nurse especially trained to this work. In speaking of the immediate care of the newborn after it has finished its perilous and arduous descent from the uterus, rest should be the first consideration. Instead of the complete and determined removal of the vernix at one sitting, this should be carried out in two or three operations with intervals of rest. The infant is not to be smothered and swathed in blankets, but kept warm by hot-water bottles, and the room temperature, instead of resembling a Turkish bathroom, should be kept at 68° or 70°. Rectal temperature is to be taken three times a day for the first few days, and if it falls below 98° sufficient external heat should be applied to keep it at 98°. The author deprecates the swabbing of nose and throat that is still the routine of many nurses. He also warns against anything but a sterile gauze dressing for the cord. Precaution is to be taken against wiping the feces toward the vagina on account of the danger of pyelocystitis in little girls. In the matter of binder and pinning blanket, the author says that the binder is usually applied so tight as to encourage colic and distress and that not being sufficient, a pinning blanket is added and applied tightly about the chest, impeding the respiration and deforming the chest. Furthermore, the infants, besides going through their daily paces of lifting, turning, dressing, undressing, scrubbing, oiling and swabbing, they are compelled to wear long clothes, stockings and booties. The rooms are usually kept at 85° and the windows tight shut. The food question next. The amount secreted by the mother's breast averages about 15 c.c. the first twenty-four hours, 75 to 80 c.c. the second, and about 170 to 180 c.c. the third twenty-four hours. About the sixth day the average milk secretion is 370 c.c. The author's plan consists in giving the infant only water the first twenty-four hours every two hours in the daytime, every four hours at night. Beginning with the second twenty-four hours the breast is given five times only in the twenty-four hours and this is continued throughout the nursing period, no night feeding being given. The continuance of breast-feeding, even in the face of digestive disturbances on the part of the baby, is urged. If there is much trouble along this line shorter nursing periods, dilution of the feedings by giving water before nursing, regulation of room temperature and regular habits are urged. In regard to artificial feeding, the author believes the German system, based on the caloric standard, and the use of whole milk is simpler than the percentage method and equally as efficient. He thinks that the need of baby specialists, baby nurses and baby hospitals is legitimate and should be generally recognized. E. F. W.

PORTER, LANGLEY, AND WEEKS, ALANSON: MEGACOLON AND MICROCOLON. (American Journal of the Diseases of Children, April, 1915, p. 283.)

Megacolon is not so rare as supposed. During the past four years over one hundred papers have appeared which deal with this condition.

Microcolon is truly an unusual condition, as only about 4 cases are mentioned in the literature. Megacolon is a name used to describe the clinical picture characterized by obstinate constipation, great abdominal distention, visible peristalsis, with the constitutional results of toxemia due to fecal retention. Finney's paper, published in 1908, so completely discusses the subject that it must remain the authoritative communication for a long time to come. Hirschsprung classified giant colon as (1) true megacolon, first noticeable at birth, and (2) pseudo-megacolon, making its first appearance in adult life and showing dilatation of the colon with hypertrophy of its muscle and arising secondary to some partial obstruction that came on during the post-natal period. Barrington-Ward divides the theories which seek to explain the origin of megacolon into four classes: (1) The mechanical, (2) the neuropathic, (3) the inflammatory, and (4) the congenital. The author believes that the fourth theory explains the known facts. He thinks that the condition is an anomaly of development and that the hypertrophy and the dilatation both occur in the fetal intestine before birth. Thus Barrington-Ward believes that there is a congenital abnormality in the lower end of the hind-gut, which takes the form of a muscular hyperplasia which gives rise both to a thickening of the walls and to an increase of the bowel lumen. The physiologic functions of the intestine are in abeyance and there is a blocking of the bowel behind for a distance, depending on the extent and the duration of the hypertrophy and dilatation. This produces necrotic changes in the mucosa. Ulcerative colitis is usually the cause of death.

The authors report 3 cases of megacolon and 1 case of microcolon. The first case seen on the fourth day of life shows true giant colon to be a condition that may present itself at birth with fully developed dilatation and hypertrophy. The differentiation between multiple stenosis and megacolon in the newborn is difficult, but the character of the peristalsis and the mildness of the digestive symptoms should guide to a proper diagnosis. Tuberculous peritonitis can be differentiated by a bimanual examination under an anesthetic. In megacolon the symptoms are present from birth. They consist of an enlarged abdomen, visible intestinal peristalsis, obstinate constipation and later anemia and toxemia from fecal retention, accompanied sometimes by recurring attacks of intestinal obstruction. Operation is the only method of relief. Colostomy with an artificial anus, and later excision of the entire large intestine with anastomosis from the cecal region into the rectum, is the first endeavor. Anastamosis and later resection may be done as a second and third operation.

C. E. F.

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ORIGINAL COMMUNICATIONS

MENINGITIS IN THE NEWBORN AND IN INFANTS UNDER THREE MONTHS OF AGE *

BY HENRY KOPLIK, M.D.
New York

Meningitis in the newborn is not only badly described in the literature, but a careful perusal of the cases thus far published must lead to the impression that the condition is overlooked, or, at first, scarcely suspected. The reason for this is at first glance evident. The newborn does not react to infection in a way to draw the attention. There may be rational symptoms of almost any condition which will inevitably remain unrecognized unless carefully looked for. The nervous and physical reaction to irritation in the newborn is extremely slow and

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obscure. It takes some time for a clinical picture to develop, and then when fully developed the complex is apt to remain uncertain. Primary meningitis in the newborn is not as common as the secondary infection, following general septic infection of the newborn. There are certain objective signs of meningitis which are unmistakable, and yet other signs occurring in infants at a more advanced age must be necessarily absent, as they are very difficult of interpretation in the newborn. Many writers give the impression that meningitis in the newborn is mostly secondary to other diseases, such as otitis, syphilis, or sepsis. This is not so. Many cases escape recognition because the onset is insidious, and it is only after the symptoms have developed to the extent of giving the picture of cerebral pressure that the case is suspected to be one of meningitis. In some states of extreme exhaustion, or atrophy, meningitis is revealed at autopsy only. I have collected all the cases from my hospital service, and with these include a consideration of some cases observed outside of the hospital. The newborn reacts very slowly to cerebral irritation, and the picture of meningitis is at first masked by rational symptoms which are apt to mislead. This is very evident after a severe labor, when the infant is born with all the signs of having passed through a critical period. In most cases there is a caput succedaneum, and in many cases of intensive delivery with forceps there are wounds about the head and neck, which necessarily make the infant for the time being limp, reactionless. It takes at least twenty-four to forty-eight hours for the local traumatisms about the head to subside, and then if any rational symptoms present themselves they must be carefully analyzed. In some cases a cerebral suggulation may closely resemble in its symptoms a meningitis. A temperature, even accompanied by convulsions, may mean a simple evanescent sepsis. In the newborn even with cerebral symptoms the body remains limp; we do not have the active development of rigidity of the neck, Brudzinsky and Kernig signs seen at a later period of infancy. In drawing the picture of meningitis of the newborn, we can only select the cases observed from the onset and interpret the symptoms for future guidance. Cases which come to the hospital, as will be seen from a reference to my series, do so when the disease has been certainly present for weeks, and only when fully developed, as a result of accumulation of fluid in the ventricles of the brain, has the mother or guardian noted any symptoms. In this respect we must not interpret the histories literally. When a mother states her infant was taken at six weeks with convulsions, fever, and unconsciousness, the presumption is that the condition producing these symptoms may, from what we know of the process, have been existent much longer than the history states. I therefore consider that an infant six weeks of age, coming to the hospital with bulging fontanel, occasional or frequent convulsions, fever, or even normal temperature, with a purulent fluid obtained by lumbar puncture, must have been ill for weeks; the symptoms have been misinterpreted or so insidious as to have rationally been overlooked, until the stage of accumulation of fluid and cerebral pressure revealed the affection.

The symptoms most characteristic of meningitis in the newborn are, first of all, convulsions. These convulsions may be frequent; at first one or two convulsions occur and with them a high temperature. The temperature at first may be quite high—105° in one of my cases. In most cases the convulsions are repeated at first, and if they recur, do so at odd intervals. This recurrence of convulsions in the newborn is quite characteristic. They recur two or four days after birth, and the temperature may not run so high a curve as at first. On the contrary, the temperature may drop gradually and after the first week only range a degree or two above the normal, and finally fall and run 100° in the rectum, while the disease is still in progress. A very characteristic feature of meningitis is the restlessness of the infant. After the initial convulsion the infant will have periods of constant crying and restlessness with normal conditions of the bowel. The conditions about the head and fontanel are at first misleading. The fontanel may show bulging only days or weeks after the onset, so that at first the fontanel gives no clue. It may show normal conditions. Before fluid accumulates, we get no MacEwen, which is characteristic, for after birth infants, even in normal states, show an increase of fluid, as compared to later infancy, so that the percussion of the skull is extremely difficult of interpretation. Kernig's sign is, as a rule, absent, the newborn lies even in the normal state with knees drawn up, and, in cases of undoubted meningitis, the Kernig is not elicited, nor is the Brudzinski sign, until a much later period, as can be seen by reference to my histories. The newborn lies, as to the head and neck, even in the normal state, quite limp, and in meningitis the rigidity of the neck is elicited at first rarely, or not at all, until weeks postpartum. A very characteristic history of primary meningitis *ab initio* in the newborn, is the following: A male infant, two and one-half weeks old, was delivered normally without forceps. Three days after birth the patient, apparently well at birth, developed convulsions with a temperature of 101°. These convulsions were repeated and ceased; after an interval of two days they returned, but now in the form of tremors or twitchings of the extremities and muscles of the face. On the eighth day the infant again had outspoken convulsions, and in one of them went into collapse. The infant during this time had a varying temperature, and after two weeks the temperature subsided, and then it was noticed that the fontanel was bulging, the sutures of the skull could be distinctly outlined and the infant did not notice the light; the pupils did not react. It will be seen in this case that not until the fontanel was bulging did any thought enter the mind of the physician that a meningitic process might be present. I wish to point out the fact that after the initial convulsions, in the interval between the general convulsions, a very characteristic twitching of the face occurred at intervals and this at times was accompanied by twitchings of the muscles of the extremities.

Very characteristic of purulent cases are convulsions accompanied by a fall in the temperature and symptoms of collapse with cyanosis resembling chills. This I have observed in a case of coli meningitis in the newborn, in whom there was a pyelitis, which was the primary infection, and from which the meningitis resulted as a secondary infection. This infant on the thirteenth day of life had chills, preceded by convulsions, which ushered in the meningitis. Another very characteristic symptom is constant vomiting; the vomiting is more in the form of a regurgitation, and has no relation at all to the time of feeding. In some cases, as in a newborn seen at one of the maternity hospitals, in which a pneumococcus meningitis was established by autopsy, there were no convulsions, but only twitchings of the extremities, apathy, and, on the tenth day, chills, cyanosis and bulging fontanel, with apathy, no rigidity or Kernig or Brudzinski. A peculiar groaning is very characteristic. The infant in breathing emits a groaning noise, as if pressure were exerted on the cerebrum similar to what is observed in brain compression in the adult, due to any cause. The temperature may at first be quite high, but after marked remissions, or even intermissions, the temperature may after a week drop to the normal and stay there, or it may run a degree or less above the normal, but rarely mounts very high. This is not generally known. The condition of the fontanel, as stated elsewhere, at first may be absolutely normal; in fact, I have compared the fontanel in one case with that of a normal newborn infant and found no difference in the early days of a meningitis. For this reason it is only when fluid accumulates rapidly or later in the disease that the fontanel becomes prominent. What are, then, the objective symptoms which would lead us to suspect a meningitis in the newborn? The first are convulsions, repeated with convulsive movements of the eyes and muscles of the extremities in the intervals, fever, constant restlessness, with vomiting; with this a suppressed groaning respiration and a temperature curve, at first very high, then gradually remitting or intermitting, and, finally, falling to or near the normal. Most of the cases after a week's duration develop a rigidity of the neck and a drawing back of the head, which indicates clearly the nature of the affection. In other words, opisthotonos is slow in developing. The most frequent diagnosis apt to be ventured in a meningitis is tetany. It should be remembered that tetany in the newborn is an even rarer occurrence than meningitis, and to make the diagnosis of tetany in the newborn is to overlook the more probable condition of meningitis. Meningeal hemorrhage, as a result of pressure during the delivery, gives a symptom complex closely resembling meningitis, but in this condition there is no fever and there are other symptoms, such as cyanosis, irregular respiration, or even apnea, which would not be present in meningitis in the early stages. The convulsions in meningeal hemorrhage are not repeated, as a rule, and the fontanel has a board-like feel, lacking pulsation and does not become prominent as the disease progresses. Even a suspicion of meningitis, in the face of equivocal symptoms, would indicate lumbar puncture.

The Nature of Infection—Of 12 cases, of which I have an actual examination bacteriologically of the fluid obtained by lumbar puncture, 4 contained streptococcus in pure culture, 3 pneumococcus, 4 meningococcus, and 1 coli bacillus, the last as a result of systemic infection from a coli pyelitis. The real pathogenesis of all cases of meningitis in the newborn, whether the meningitis occurs as a primary manifestation or as secondary, or with foci of infection, such as in some of my cases, arthritis or pyelitis must be considered in the nature of an infection of a septic character. In only 1 case of meningococcus infection has there been a blood culture and that was negative. In 1 streptococcus case accompanied by arthritis, the blood culture was positive, revealing streptococci. The fluid obtained by lumbar puncture is, as a rule, purulent if there is a streptococcus or a pneumococcus meningitis. In meningococcus cases it may simply be cloudy or colorless. It may be so thick and viscid as to flow with difficulty from the needle. The cytology is a polynuclear one and the leukocytes may make up 100 per cent. of the cells. The albumin in the puncture fluid of the cases here attached seems to vary from 4 mm. to 8 mm. It may be of interest to note that in the meningococcus cases in which ventricular puncture was made meningococci were found in the ventricular as well as in the lumbar fluid.

The prognosis of meningitis in the newborn is, as may be *a priori* surmised, very grave. All the streptococcus cases died, as well as the pneumococcus case. The coli case developed hydrocephalus, and died later in infancy, whereas all but one of the meningococcus cases died. The only one which recovered did so with hydrocephalus. It is noteworthy that the prognosis is so fatal, and still I think that the meningococcus cases, if discovered early, may be brought to a quiescent period by early and prompt treatment. The only danger is that the subsequent hydrocephalus may not limit itself, but may increase to such an extent as to cause idiocy. Lumbar puncture, I find, is most apt to meet insurmountable obstacles in the newborn, where the cerebral canals leading into the subdural space are exceedingly narrow in caliber, and at the third or fourth puncture the fluid is apt not to flow from the subarachnoid space. This occurred in the case of meningococcus meningitis, which made a recovery. In this case, after the third introduction of serum, the canal of Majendi closed, thus making further therapy impossible, except through the routine of ventricular puncture. This case was punctured on the tenth day of life. In 2 cases in my service, one a meningococcus, another a streptococcus case, ventricular puncture was performed. In both the procedure was of no avail, though in 1 case the ventricles were irrigated with methyl blue. From what I have seen of ventricular puncture—and my experience ranges over a number of cases, not only in the newborn, but at a later period of childhood—it is a very unsatisfactory procedure. The newborn seem to go into a condition of collapse after the ventricular puncture, from which they do not recover. The question naturally presents itself as to how in the cases not complicated by other symptoms of sepsis of the newborn, these infants contract a pneumococcus or meningococcus meningitis. In those cases which I have followed in maternity institutions I found that the infants were born after a stormy or prolonged labor; that methods of resuscitation had been rigorously applied, among others, mouth to mouth and catheter suction. The natural inference in these cases is that the infection took place possibly from the mouth of the accoucheur to that of the infant. Especially as in these cases there are recent wounds in the mucous membrane of the mouth, the contention of Epstein that systemic infections may take place through these buccal solutions of continuity seems not unlikely.

SUMMARY OF CASES

Year	Age	DIAGNOSIS	No. of Cases
1909	6 weeks	Sepsis neonatorum: arthritis; meningitis (streptococcus)	1
1910	7 weeks	Meningitis (streptococcus)	1
1912	Newborn	Meningitis (coli bacillus) followed by hydrocephalus; died at 16 months	1
1913	10 weeks	Meningitis cerebrospinal (meningococcus)	
	8 weeks	Meningitis (pneumococcus), convulsions	
	3 months	Meningitis (pneumococcus), congenital syphilis Hochsinger thickening of skin	
	6 weeks	Meningitis (streptococcus)	
	3 months	Meningitis, cerebrospinal (meningococcus)	5
1914	6 weeks	Meningitis (meningococcus)	1
1915	3 months	Meningitis, cerebrospinal (streptococcus)	1
1915	Newborn	Meningitis (pneumococcus) (Maternity Hospital)	1
1915	Newborn	Meningitis (meningococcus) (Maternity Hospital); hydrocephalus	1

Total number of cases 12

CASES FROM MT. SINAI HOSPITAL, CHILDREN'S SERVICE

BACTERIOLOGICAL EXAMINATIONS CARRIED OUT BY BACTERIOLOGICAL LABORATORY OF THE HOSPITAL

CASE I.

Name, Pauline; age, six weeks; admitted, June 16, 1909; died, June 26, 1909.

DIAGNOSIS—Sepsis neonatorum; arthritis; meningitis (streptococcus).

PAST HISTORY—Full term, normal labor; breast-fed. No previous illness.

PRESENT HISTORY—Began three days ago with fever. Child cries when touched. Yesterday mother noticed redness and swelling of right hand and to-day of right foot. No vomiting. No convulsions. Bowels normal.

EXAMINATION—General condition good; well nourished.

Head—Anterior fontanel admits one finger.

Eyes—Slight convergent strabismus. Pupils equal, react to light.

Mouth—Tongue clean.

Skin—Purplish hue on exposure to air.

Lungs—Negative.

Heart—Rapid, regular, no murmurs. Epigastric pulsation present.

Pulses—Equal, rapid, regular, fair force.

Liver—Fourth to fifth space, felt one finger below ribs.

Spleen—Felt just below ribs.

Extremities—Edema, swelling right upper extremity, pits on pressure. Extremity seems to be tender. Swelling most marked in hand and forearm. In outer part of palm of hand is a red, tender area. No paralysis. Few enlarged glands in right axilla.

Lower Extremities—Redness, swelling and tenderness of right foot at metatarsal phalangeal joint. Slight edema of dorsum of foot.

June 17th—Redness of right hand is more marked. Leukocytes, 20,600; polynuclears, 56 per cent.; small lymphocytes, 40 per cent.; large lymphocytes, 4 per cent.

June 18th—Left hand and forearm is swollen, tense, apparently tender, same region as other hand. All bones are tender to pressure.

June 18th—9 P.M. Edematous swelling of right forearm just above right wrist, probably involving epiphysis of radius and ulna. Edematous swelling of dorsum of left hand. Similar swelling over metatarso phalangeal joint of right big toe. No fluctuation in any. Advice, waiting. At first sign of fluctuation swelling to be incised. Wet dressings to be applied.

June 20th—Incision and drainage of multiple abscesses. One abscess on back of left hand, one on palmar surface of right hand, leading up to one inch above ligament. One on each foot. Each was opened and drained. Wet dressings.

June 22d—Left shoulder slightly enlarged, tender. Swelling and induration in front part of left shoulder. Slight icterus. Leukocytes, 12,400; polynuclears, 45 per cent.; large lymphocytes, 8 per cent.; small lymphocytes, 47 per cent.

June 23d—General condition worse. This afternoon had general clonic convulsion.

June 24th—Child unconscious. In frequent tonic, occasional clonic convulsions. Head turned to right with conjugate deviation of eyes. Fontanel not bulging. Local condition: Moderate purulent discharge from all the foci. Lumbar puncture: At level of crests—12 c.c. of cloudy fluid obtained.

June 25th—General condition worse. Several convulsions during past twenty-four hours. Child unconscious.

TEMPERATURE—Ranged from 100° to 104.8°.

LABORATORY EXAMINATIONS—June 18th: Blood culture: Staphylococcus albus. June 20th: Culture of pus: Streptococcus. June 22d: Blood culture: Staphylococcus albus and streptococcus. June 24th: Cerebrospinal fluid: Streptococcus.

RADIOGRAPHIC REPORT—June 26th: No change in the bones of the right forearm, wrist and hand. There is present complete flexion of the finger.

Case II.

Name, Morris; age, seven weeks; admitted, December 30, 1909; died, January 1st, 1910.

Diagnosis—Streptococcus meningitis.

Previous History—Normal delivery. Occasional regurgitation after taking breast.

Present Illness—Began ten days ago with convulsion. Child appeared ill, vomited two or three times a day, developed fever. Began to have repeated convulsions and unconsciousness two days ago. Some rigidity of jaw.

Examination—Child unconscious. General convulsions produced on attempt at examination. Neck not rigid. Fontanel bulging. Jaw rigid. Rigidity of extremities. Marked Kernig. Few râles posteriorly over lungs.

December 30th—Lumbar puncture showed thick pus containing streptococcus. 10 c.c. antimeningococcus serum introduced.

Temperature—98° to 102.2°.

Case III.

Name, Irving; age, ten weeks; admitted, January 11, 1913; died, January 12, 1913.

Diagnosis—Cerebrospinal meningitis.

Family History—Mother's first baby died of meningitis at age of two months.

Past History—Normal delivery; no diseases of infancy.

Present Illness—Began suddenly three days ago with fever and irritability. No convulsions, no vomiting at onset. Yesterday baby vomited (curdled milk) and mother noticed that all motions of neck became painful. To-day mother noticed mottled rash on body and extremities. Stools, three or four daily; greenish, no blood.

Examination—General condition fair; patient irritable. Well nourished.

Head—Marked rigidity of neck. Anterior fontanel admits two fingers, tense, bulging. Posterior fontanel admits tip of one finger.

Eyes—Pupils equal, react to light, no palsies.

Mouth—No teeth, gums negative. Throat somewhat congested.

Glands—Few posterior cervicals. Enlarged.

Skin—Scattered over entire chest and abdomen anteriorly and posteriorly, also over upper and lower extremities is profuse crescentic, rose-colored, macular eruption, disappearing on pressure. No desquamation. This eruption is more confluent over the neck, where small areas of erythema are present, extending from ears to chin. Nothing on face above level of ears.

Chest—Expansion good; respirations regular.

Lungs—Negative.

Heart—Action rapid, regular, good force.

Pulses—Equal, regular, good force.

Liver—Felt three fingers below.

Spleen—Not felt.

Abdomen—Distended, tympanitic, no masses.

Genitals—Negative. Testes descended.

Extremities—Upper, negative. Lower, knee-jerks exaggerated; no Kernig. Inconstant Babinski.

January 12th—2:30 A.M. Lumbar puncture: 8 c.c. of very turbid fluid obtained under very low pressure. About 10 c.c. of Flexner serum injected, when child began to breathe very poorly, and then stopped breathing. In spite of artificial respiration for one-half hour, child died.

TEMPERATURE—101.2° to 103.2°.

LABORATORY EXAMINATION—January 12th: Cerebrospinal fluid: Albumin, 8 mm.; bacteria, meningococcus; reduction, none; cytology, polynuclears, 100 per cent.

CASE IV.

Name, Lilly; age, eight weeks; admitted, February 7, 1913; died, February 8, 1913.

DIAGNOSIS—Pneumococcus meningitis; convulsions.

FAMILY HISTORY—Negative.

PAST HISTORY—Full-term child; normal labor; child blue at birth and was asphyxiated, necessitating artificial respiration.

Breast-fed. Since one week of age child has had rash on body.

Present Illness—Onset three days ago, with cough, fever and diarrhea. Stools are green and watery. Yesterday child had a convulsion. Has vomited several times since onset.

Examination—General condition poor; fairly well nourished. Child moans more or less continuously. Lies with head retracted and hands and feet in tetanic spasm.

Head—Anterior fontanel open, admits four fingers, tense, bulging. Posterior fontanel open. Slight rigidity of neck.
Eyes—Eyelids puffy. Slight discharge from both eyes.
Ears and Mastoids—Negative externally.
Nose—Slight mucoid discharge.
Mouth—Tongue moist.
Skin—Scattered over back of neck and in folds of skin at axillæ, groins, covering vulva, buttocks and extending on to abdomen and thighs is scaling, erythematous, dry, seborrheic eruption. Skin itself feeling hard, not raised. Scales are large, flat and extend down to feet. Excoriations around vulva and anus, oozing serum.
Lungs—Negative.
Heart—Borders normal, no murmurs, action good.
Pulses—Equal, regular, fair force.
Liver—Felt two fingers below ribs.
Spleen—Not felt.
Abdomen—Large, tympanitic, no masses.
Extremities—Carpopedal spasm. Knee-jerks obtained. Slight Kernig. Bilateral Babinski.
Vaginal—Slight vaginal discharge.

Temperature—101° to 102.8°.

Laboratory Examination—February 13th: Cerebrospinal fluid: Cytology, polynuclears, 100 per cent.; albumin, 6 mm.; reduction, none; bacteria, pneumococcus in spreads and culture.

Case V.

Name, John; age, three months; admitted, February 10, 1913; died, February 12, 1913.

Diagnosis — Pneumococcus meningitis; congenital syphilis; Hochsinger thickening of skin.

FAMILY HISTORY—Mother has been pregnant seven times; four stillbirths; one child died in infancy; one child alive and well.

PAST HISTORY—Full term child; normal labor; breast-fed.

PRESENT ILLNESS—Onset six weeks ago, with a rash over entire body and snuffles. These symptoms disappeared under treatment. Yesterday morning child began to snuffle again and had a slight cough. This morning vomited and had a convulsion. No diarrhea. No urinary disturbances.

EXAMINATION—February 10th: General condition poor. Patient very irritable, moaning, very pale.

Head—Anterior fontanel admits three fingers, tense, bulging; posterior admits one finger, rather tense.

Neck—Marked rigidity.

Eyes—Pupils equal, react to light, no palsies.

Mouth—No teeth; gums fair; tongue moist. Two small petechiæ on palate.

Chest—Symmetrical; expansion fair.

Lungs—Negative.

Heart—Action rapid, regular, forcible, no murmurs.

Liver—Felt three fingers below ribs.

Spleen—Not palpable.

Abdomen—Lax, tympanitic.

Skin—Scaling of palms and soles. No blebs. Maculopapular eruption of extensor surfaces of legs and feet. Eruption is for most part hemorrhagic. Large copper-colored papular eruption around anus.

Extremities—Knee-jerks markedly increased. Bowing of both tibiæ. Slight Kernig. Babinski present when Kernig obtained.

Genitals—Both testes descended. Scrotum large and covered with papules.

February 11th—Lumbar puncture: 10c.c. turbid fluid removed.

TEMPERATURE—98° to 108°.

LABORATORY EXAMINATION—February 12th: Wassermann reaction positive. February 13th: Cerebrospinal fluid: Marked increase in globulin; Wassermann, positive. Cytology, polynuclears, 100 per cent.; reduction, absent; albumin, 8 mm.; bacteria, pneumococcus in spreads and cultures.

Case VI.

Name, Henry; age, six weeks; admitted, May 27, 1913; died, May 28, 1913.

Diagnosis—Streptococcus meningitis.

Past History—Delivery at seven months.

Present Illness—About three days ago rather suddenly child became feverish, had convulsions, which have been repeated at frequent intervals, vomited at onset. Refuses nourishment. Bowels constipated. Coughs at times.

Examination—General condition poor; restless; breathes with difficulty.

Eyes—Rolls eyes about; no palsies.

Head—Marked bulging of anterior fontanel.

Neck—Slight rigidity.

Mouth—Tongue slightly coated.

Lungs—Posteriorly, dullness over right base; diminished breathing, bronchophony present.

Heart—Action regular, rapid, sound of fair force, no murmurs.

Pulses—Imperceptible.

Abdomen—Negative.

Extremities—Kernig present, especially on right side, no Babinski or clonus. Marked spasticity of all extremities.

May 27th—Lumbar puncture: 20 c.c. turbid fluid under marked pressure removed. 15 c.c. of meningitis serum injected.

Temperature—102.4° to 103°.

Case VII.

Name, David; age, three months; admitted, September 15, 1913; died, September 22, 1913.

Diagnosis—Meningococcus cerebrospinal meningitis.

Past History—No previous illnesses; normal birth; breast-fed.

Present Illness—Child has been sick for a week with green stools and slight cough for past three days. Has been apathetic. No convulsions. Neck has been stiff for past two days.

EXAMINATION—General condition poor, child extremely irritable and restless; shrieks loudly.

Eyes—Pupils equal; react to light; internal strabismus in left eye.

Mouth—No teeth. Tongue clean.

Head—Marked bulging anterior fontanel.

Lungs—Negative.

Heart—Action rapid, fair force.

Pulses—Equal, regular, rapid.

Liver and Spleen—Not felt.

Abdomen—Lax, tympanitic, marked tache cerebrale.

Extremities — Knee-jerks exaggerated. Bilateral Kernig, Brudzinsky and Babinski.

September 16th—Lumbar puncture attempted, nothing obtained. Ventricular puncture, 35 c.c. bloody fluid obtained. 25 c.c. Flexner serum' injected.

TEMPERATURE—Ranged from 101° to 105.4°.

LABORATORY EXAMINATION—September 16th: Cerebrospinal fluid: Cytology, polynuclears, 100 per cent.; bacteria spreads and cultures, meningococcus; albumin, 8 mm. ring; reduction, none.

CASE VIII.

Name, Louis; age, six weeks; admitted, August 2, 1914; died, August 7, 1914.

DIAGNOSIS—Meningococcus meningitis.

FAMILY HISTORY—Two other children, one of whom died of pertussis. Mother had two miscarriages.

PAST HISTORY—Labor difficult, but not instrumental; breast-fed up to present; no previous illnesses.

PRESENT HISTORY—Yesterday at 5 A.M. child began to cry and had fever (104.5°) and became "stiff." At 4 P.M. to-day had convulsion lasting ten minutes; convulsion was general. Bowels moved frequently, green stools, with catharsis.

EXAMINATION—Child cries.

Eyes—Normal.

Head—Fontanel prominent when child cries.

Neck—No rigidity.

Skin—Cup marked.

Heart and Lungs—Negative.

Abdomen—Moderately distended.

Extremities—No paresis. No abnormal reflexes.

August 3d—Lumbar puncture: 2 c.c. of turbid, slightly blood-tinged fluid obtained under increased pressure.

August 4th—Lumbar puncture: 1 c.c. of turbid fluid obtained under appreciable pressure. Ventricular puncture: 10 c.c. of blood-tinged fluid obtained under pressure. 10 c.c. of anti-meningococcic serum given by lumbar puncture. 4:30 P.M., child in a general clonic convulsion, which lasted for ten minutes. Cyanosed, regurgitating fluid. Face, neck, arms and legs twitching. Fingers tightly clenched over thumbs. Slight Kernig and marked Brudzinski with irritability on head flexion.

August 5th—Lumbar puncture disclosed presence of cloudy fluid; 2 c.c. removed. Ventricular puncture at left angle also gave cloudy cerebrospinal fluid; 15 c.c. removed. Through ventricular puncture anti-meningococcus serum, 25 c.c. diluted with saline and methylene blue, injected slowly. At expiration of about twenty minutes blue cerebrospinal fluid flowed from the lumbar puncture needle, which was left in place. Condition fair throughout, camphor, grain ii, being given to ward off any possible collapse. Pulse varied with intraventricular pressure, slowing with increase. No change in respiration.

August 7th—Convulsions continue. Fontanel no longer bulging. Has nystagmus. Is spastic. Pulse rapid, but regular. Ventricular puncture: 5 c.c. of cloudy amber fluid obtained under increased pressure, somewhat blood-tinged. 5 c.c. of antimeningococcic serum introduced. Lumbar puncture: 3 c.c. of cloudy amber fluid obtained under pressure, somewhat blood-tinged. 10 c.c. of antimeningococcic serum introduced.

TEMPERATURE—100° to 104.6°, with a rise to 106° on the day of death.

LABORATORY EXAMINATIONS—

August 3d—Cerebrospinal fluid: Cytology, 95 per cent. polynuclears; reduction, none; bacteria, meningococcus; albumin, 4 mm.

August 4th—Ventricular cerebrospinal fluid: Cytology, fresh blood present; bacteria, meningococci; albumin, 5 mm. ring; reduction, none. Spinal cerebrospinal fluid: Cytology, 95 per cent. polynuclear leukocytes; bacteria, meningococci; albumin (quantity insufficient); reduction (quantity insufficient).

August 5th—Spinal cerebrospinal fluid: Cytology, 95 per cent. polynuclear leukocytes; bacteria, meningococci; albumin, 5 mm.; reduction, none. Ventricular cerebrospinal fluid: Cytology, 95 per cent. polynuclear leukocytes; bacteria, meningococci; albumin, 4 mm.; reduction, none.

CASE IX.

Name, Leonard; age, three months; admitted, February 26, 1915; died, March 1st, 1915.

DIAGNOSIS—Cerebrospinal meningitis (streptococcus).

PAST HISTORY—Full term; high forceps delivery; breast-fed; normal development.

PRESENT ILLNESS—Began ten days ago with slight fever and constipation, which continued off and on until yesterday morning, when the child suddenly became very drowsy and lay motionless for hours; this condition continued until this afternoon, when the child had three general convulsions within five hours, each lasting three to five minutes, frothing at the mouth, but no vomiting. Bowels kept open by catharsis; urination normal.

EXAMINATION — General condition fair, acutely ill, well nourished.

Head—Slight retraction. MacEwen marked. Anterior fontanel three fingers, distinctly bulging, tense.

Eyes—Double internal strabismus. Pupils equal, regular, react to light.

Lungs—Negative.

Heart—Rapid, regular, fairly good quality.

Abdomen—Rounded, soft, tympanitic.

Extremities—Brudzinski present; slight Kernig right side.

Skin—Tache. Small ulceration over right scapula.

February 26th—9:15 P.M. Child had generalized convulsions, affecting chiefly left arm and foot, with head turned to left, lasting three minutes. 11 P.M. Lumbar puncture:

25 c.c. cloudy fluid obtained under high pressure. 12 c.c. serum slowly introduced.

February 27th—9:30 a.m. Lumbar puncture: 20 c.c. very turbid fluid obtained under high pressure. 12-15 c.c. serum injected, passing in very slowly and with difficulty. Leukocytes, 12,000; polynuclears, 85 per cent.; lymphocytes, 15 per cent.

February 28th—Child semi-conscious, fontanel bulging. Brudzinski very marked. General condition very poor. 4 c.c. thick purulent fluid under pressure withdrawn by right ventricular puncture. 10 c.c. polyvalent antistreptococcic serum injected.

March 1st—General condition worse this morning. Double internal strabismus. Fontanel bulging. Respiration and pulse irregular. Twitching of both arms and legs. Death.

Temperature—101.4° to 103.2°, with rises to 104.8° to 106.4° on the day of death.

Laboratory Examination—February 26th: Cerebrospinal fluid: Cytology, polynuclears, 95 per cent.; mononuclears, 5 per cent.; bacteriology, streptococcus; albumin, 6 mm. ring; reduction, none.

Private Cases

Case I.

Male infant. Newborn.

History—Baby circumcised on eighth day, ran temperature from time of circumcision to three days subsequent.

Examination—Negative as to chest, heart, lungs, abdomen. Sensorium free. No signs of meningitis.

Examination of Urine—Showed coli pyelitis.

Baby ran irregular temperature one week, when there was a chill, combined with repeated convulsions, and collapse. After these signs meningitis developed. Infant did not appear to see light. Fontanel became prominent.

Lumbar Puncture—Revealed a coli meningitis. Hydrocephalus developed. Infant died at sixteen months, of asthenia and necrosis of both eyes.

Three lumbar punctures made.

Coli meningitis.

CASE II.

Male infant. Newborn.

HISTORY—Infant seen at Maternity Hospital on the ninth day of disease. It had been limp and reactionless since birth. No temperature. When seen it was limp, had a peculiar groaning respiration, Cheyne-Stokes in rhythm. Pulse slow and irregular. Fontanel tense.

EXAMINATION—Showed no retraction of the head, but distinct fluid in the head, no bulging of fontanel, although tense.

EXAMINATION OF CHEST—Few râles at the bases.

DIAGNOSIS—Meningitis or hemorrhage.

LUMBAR PUNCTURE AND AUTOPSY—Pneumococcus found in the puncture fluid.

AUTOPSY OF THE BRAIN AND CORD—Showed a serofibrinous exudate over the surface, and over the posterior surface of the cord.

Pneumococcus meningitis.

CASE III.

Male infant. Newborn.

HISTORY—Infant seen at one of the private hospitals of the first rank. Had been running a temperature since birth. Saw the baby on the third day of life. Very prolonged labor after thirty-six hours. Infant born in suspended animation. Vigorous efforts at resuscitation. When seen on the third day was in excellent condition.

EXAMINATION—Negative; head, fontanel normal; no marks of delivery.

EXAMINATION OF URINE—Showed blood, blood casts and albumin.

Temperature, 105°. Had one convulsion, which was not repeated. The umbilical stump seemed normal.

Patient ran a temperature of 105°, 103°, irregular, remittent, and, finally, on the tenth day, temperature became normal. During this time, however, the child developed slight twitchings about the muscles of the face, especially on the left side. Took its food regularly, but had periods of restlessness and crying, especially at night. Artificially-fed. On the ninth day it was noticed that there was slight retraction of the head, but not excessive. Fontanel not bulging. In view of the continued twitching of the muscles, the preceding convulsion, and the temperature, the diagnosis of meningitis was made.

LUMBAR PUNCTURE PERFORMED—Expert examination of the fluid showed meningococcus. Flexner serum injected. Two subsequent punctures made and serum introduced. At the fourth puncture no fluid was obtained.

EXAMINATION OF THE BLOOD—Culture made. No microörganisms found.

Patient made apparently good recovery. The drawing back of the head, which became marked, gradually disappeared. The infant is still alive, has an hydrocephalus, is exceedingly bright and holds head up. Hydrocephalus apparently has come to a standstill. Nine months of age. Head circumference, 51 cm.

Meningococcus meningitis.

30 East Sixty-second Street.

PROTECTIVE VACCINATION FOR VARICELLA—Ed. Handrick (Monats. f. Kinderhk., Bd. XIII., Nr. 5, 1914) says that Kling inoculated children who had been exposed to varicella with serum derived from the pustules of the sick children, with a view to obtaining prevention of the disease. After vaccination in this manner there were seen at the site of inoculation typical varicella blebs, which matured and dried in the normal manner. In some children a modified form of the illness occurred. When this inoculation was carried from one child to another there appeared to be a preventive effect. Of 95 cases exposed to varicella, 31 were inoculated. Only 1 of these took the disease. Of the 64 unvaccinated children, 44 took the disease. The author repeated this experiment on three small groups of children with the following results: He found that of 127 inoculated children, 45 later developed varicella. He therefore believes that we have not yet attained a practical method of prevention of varicella by this method.—*American Journal of Obstetrics.*

FURTHER EXPERIENCE WITH HOMOGENIZED OLIVE OIL MIXTURES*

BY MAYNARD LADD, M.D.,

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In February, 1915, before the New England Pediatric Society, and in May, 1915, before the American Pediatric Society, I called attention to the possible uses of the homogenizing machine of M. Gaulin of Paris, for purposes of modifying milk for difficult cases of feeding, especially those showing intolerance for fat.

Briefly stated, homogenization of liquids of different densities consists in reducing the constituent elements to such a physical condition that they will no longer separate but will maintain a permanent and even composition throughout the mixture. This object is attained by means of a powerful pump which forces the mixture through a finely ground agate valve against a pressure of from 3,000 to 5,000 pounds to the square inch. In the case of mixtures of milk and oils, the fat globules are so crushed and pulverized that they became incorporated with the other elements of the milk so that they no longer rise by action of gravity nor separate after long standing. It is possible by this process to improve the emulsion of a modification of cow's milk so that it will be even finer than that of breast milk without altering in any way the chemical properties of the milk. There is reason to believe that a milk so treated may be better digested and assimilated. Still more interesting, however, is the possibility of substituting some other fat than cow's fat in cases of malnutrition, in which it is often difficult to give enough fat to make a child gain normally in weight without precipitating sooner or later a digestive crisis.

These cases of difficult feeding respond best of all to breast milk, which contains anywhere from two to three times as much fat as the child will take in a cow's milk modification. It is a question, therefore, whether such cases are correctly classified as due to fat intolerance. It would appear more reasonable to suppose the so-called intolerance to be due to something which is peculiar to cow's fat and is not present in breast milk.

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* Read at the Twenty-eighth Annual Meeting of the American Pediatric Society, held at Washington, D. C., on May 8, 9 and 10, 1916.

The principal differences in the fats of cow's milk and human milk are the size of the fat globules and the proportion of volatile fatty acids. The proportion of volatile fatty acids in breast milk is 2.5 per cent. of the total fat; in cow's milk 27.0 per cent. of the total fat. The non-volatile fats are made up mostly of olein and palmitin in both cow's milk and breast milk. Olive oil is almost wholly olein and palmitin, and free from the volatile fatty acids which form such a large proportion of cow's milk fat. It was my suggestion, therefore, to utilize olive oil to obtain the fat percentages in modified milk mixtures and so to eliminate the volatile fatty acids; and also by homogenization to secure an emulsion as fine or finer than that of human milk. The milk sugar and proteins were to be obtained from skimmed milk as usual, and additional carbohydrates, in the form of dextrin-maltose and starch prescribed according to the usual indications.

This method of feeding has been applied to 37 cases, of which 12 occurred in private practice and 25 in the out-patient department of the Children's Hospital. The present series includes the subsequent histories of the cases reported last year. I have not included in this list the older children, whose diet was from the start a mixed one, and which would, therefore, come into another class. I have also excluded 1 private case of congenital heart and enlarged thymus, 2 or 3 hospital cases which had the milk for a few days only, and a few which have recently been started. The series as tabulated includes practically all of the cases of difficult feeding that I have had an opportunity to study.

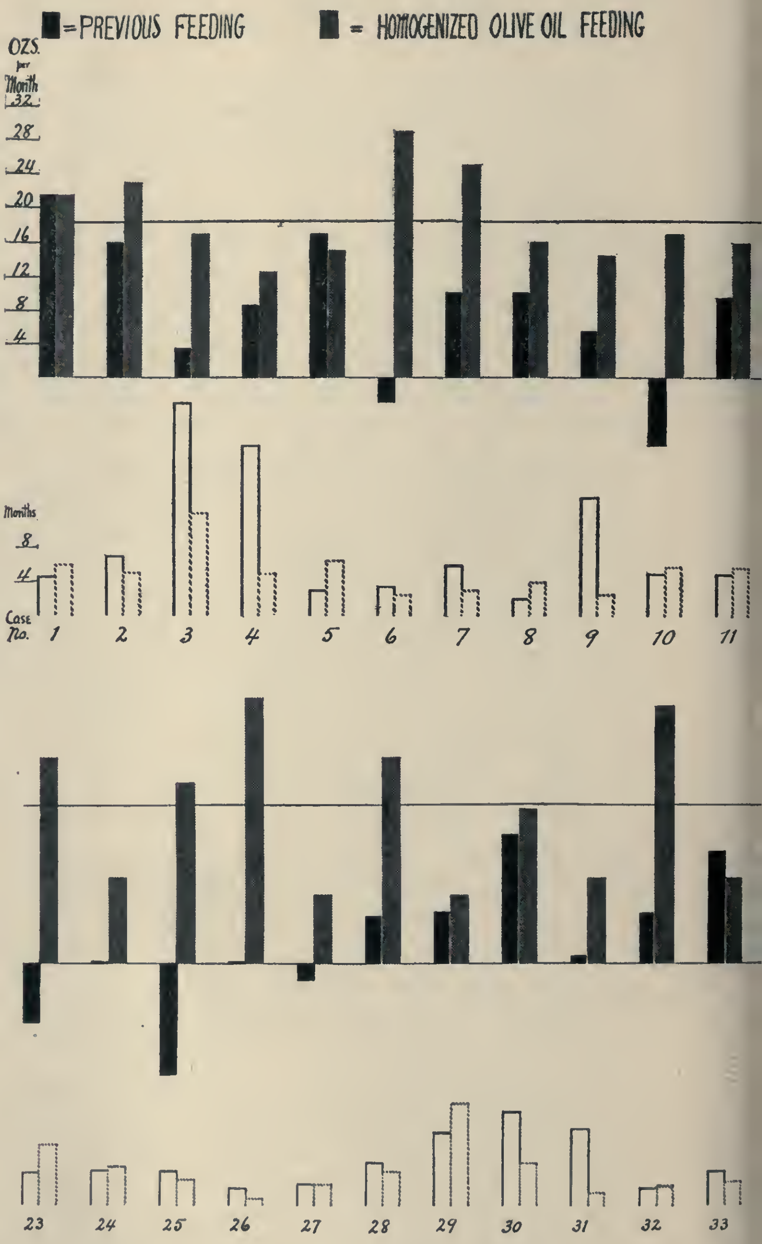
It should be borne in mind that the hospital cases which I used were babies which had been under treatment for malnutrition and indigestion for considerable periods without making satisfactory progress in their weight development under the usual methods of feeding. The average length of this period of out-patient feeding in this series, before beginning the homogenized olive oil mixtures, was three months. The result of previous feedings is best appreciated when one understands that the average number of months was 6.3 with an average gain of only 5 ounces per month. Naturally in such a series all types and degrees of indigestion were met with. It is not difficult to modify milk in such a way that fairly normal movements and freedom from discomfort are obtained, but the failure of the feeding is shown by the lack of normal weight development—and by digestive disturbances brought about when the attempt is made to raise the fats to such a point that normal gains in weight should be expected.

A normal, healthy baby gains, according to a high standard of growth, 14 pounds in twelve months, or an average of 18.7 ounces per month.

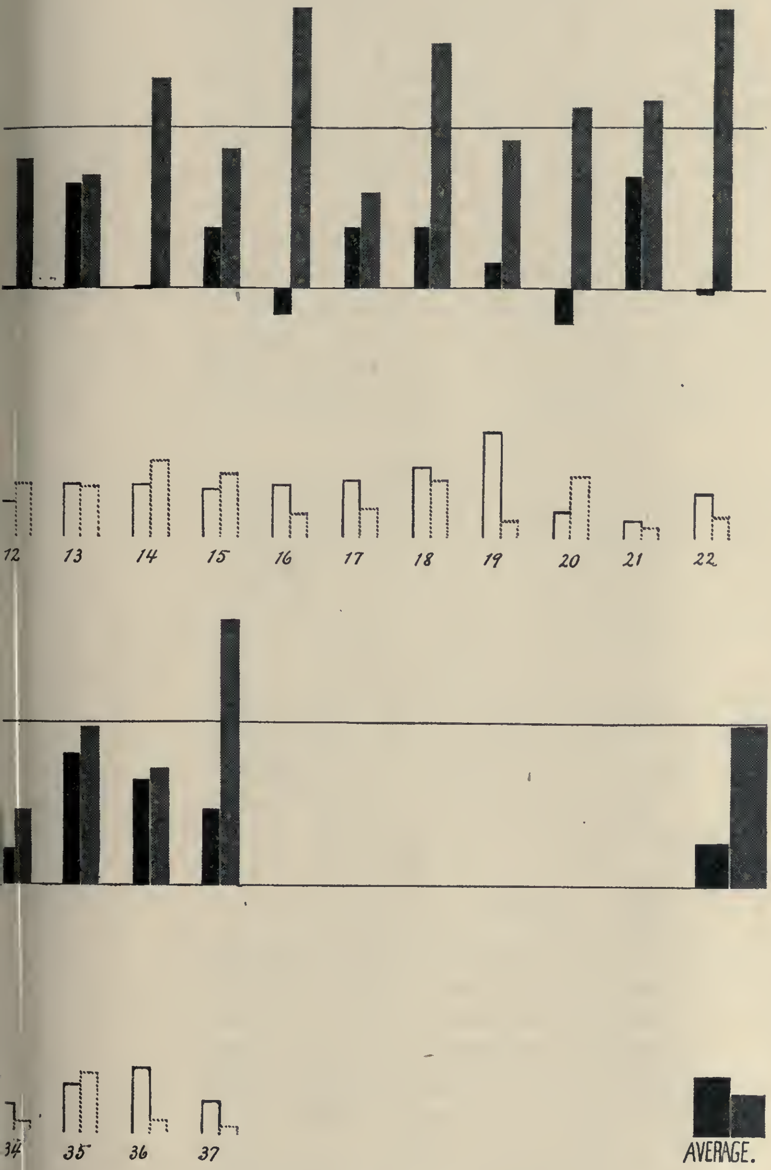
In my series of 37 cases, whose average gain on previous feedings was 5 ounces per month, for a period of 6.3 months, the average gain per month was 18.15 ounces, or within one-half ounce, per month of the normal, healthy infant. This represents a gain of three and one-half times (363 per cent.) over that of the previous feeding. The average period of the homogenized olive oil feeding was 4.7 months, a sufficient time to determine its permanent effects.

The improvement in the babies' general condition has been as striking as that of their gain in weight. Vomiting and sour regurgitation, when present as symptoms, are quickly relieved. The child improves in strength, in the quality of its fat and in the development of its functions, as one expects it to do in normal successful feeding. The appetite improves rapidly, and the stools soon become normal in appearance, if the sugars are intelligently prescribed. By this I refer to proper proportions of dextrin and maltose. When there is a tendency to looseness, I have used the preparation known as "dextri-maltose," for the extra carbohydrates; on the other hand, when the bowels are constipated, the usual laboratory "maltose," or malt soup preparations, are preferable. In many cases a combination of the two will bring about a normal stool if used in proportions suited to the individual child. Barley water (0.75 per cent.) was used in nearly every case. In some cases the mixture was treated to 212° F., in others given unheated. Lime water was usually given in amounts of 5 to 10 per cent. of the total mixture, but not as a matter of routine.

The percentage of olive oil was almost invariably started at 1.50 and did not exceed 3.50 per cent. The indication for raising this was the rate of gain and sense of hunger. The total carbohydrate was usually started at about 5 per cent. and never exceeded 7 per cent. The proteins were started at 1.50 per cent. and seldom exceeded 2 per cent. In my opinion hunger is the safest guide as to the child's tolerance for the amount of fat it is taking. If the appetite remains keen, the olive oil is being well taken care of; if too much fat appears in the stools or if diarrhea



In an attempt to express the results of these feeding cases in a form which will be readily understood, I have in the chart reduced the total gain to the average number of ounces gained per month, during the previous feedings (on the left) and during the homogenized olive oil feedings (on the right) for each case. The upper horizontal black line represents the average number of ounces per month gained by the



normal healthy infant. The relative gain in both periods of feeding is at once apparent, and a comparison is readily made with that of a normal infant. Below, on the left, are charted the number of months the infants were on the previous feeding; and on the right the number of months they were on the homogenized olive oil milk in each case.

and vomiting occur, a loss of appetite almost invariably occurs and gives positive indication for a reduction of both fats and sugars. According to Freund the average normal proportion of soaps in the stools is 18.3 per cent. of the total fat, the extreme limits varying from 4.9 per cent. to 35.9 per cent. The mere presence of soaps in the stools, therefore, unless quantitatively determined to be beyond the normal limit, is not of itself a sure indication of fat intolerance.

This method of dealing with cases of fat intolerance and other cases of difficult feeding is applicable in cities supplied by milk laboratories and in hospitals which will incur the expense of installing an homogenizing machine. If further experience in a larger number of cases is in line with the results I have obtained in a comparatively small series, such an expense will be fully justified.

In an attempt to express the results of these feeding cases in a form which will be readily understood, I have in the chart reduced the total gain to the average number of ounces gained per month, during the previous feedings (on the left) and during the homogenized olive oil feeding (on the right) for each case. The upper horizontal black line represents the average number of ounces per month gained by the normal healthy infant. The relative gain in both periods of feeding is at once apparent, and a comparison is readily made with that of a normal infant. Below, on the left, are charted the number of months the infants were on the previous feeding; and on the right the number of months they were on the homogenized olive oil milk in each case.

OLIVE OIL MIXTURES IN INFECTIOUS DIARRHEAS

As my experience during the winter had convinced me that olive oil homogenized in milk mixtures was well tolerated in the diarrheas due to indigestion and fermentation, I was interested to see if it could not be safely used in the early days of convalescence from infectious diarrheas to supply additional calories and prevent or lessen the loss of weight which occurs in such cases.

Owing to the courtesy of Dr. Bowditch, Dr. Wyman made use of this suggestion last summer in his service at the Floating Hospital. The general scheme of treatment was as follows: After the initial period of carthարsis and starvation, a fat-free lactic acid milk, diluted two-thirds or one-half, was given. If the infecting organism proved to be of the Flexner or Shiga type, dextri-maltose was added up to 4 or 5 per cent. and sometimes barley water. If the gas bacillus was present, no carbohydrates were added. After a period of several days, when the acute febrile disturbance showed distinct signs of subsiding, olive oil was homogenized with the lactic acid milk, in percentages of 1.00, 1.50 and if well tolerated 2.00—thus adding considerably to the caloric value of the food.

The results briefly summarized were as follows: There were 19 cases of infectious diarrhea on the service, 15 of Flexner bacillus type, 1 of the gas bacillus, and 3 undetermined. Four cases died, giving a mortality of 22 per cent., about the same, I am informed, as in the other services. Of the 15 cases that lived 8 were in the hospital on an average of twenty-one days each and lost over their entrance weight an average of 15 ounces. Seven were in the hospital on an average of fourteen days each, and gained an average of 10.7 ounces over their entrance weight. The average net loss of all 15 surviving cases was therefore only 3 ounces over their entrance weight. Whether this showing was better or worse than in the other services we have no statistics to show. It is my opinion, however, based on this limited series of cases, that olive oil homogenized can be given safely after the severe acute febrile stage has passed and in the period of convalescence and is more effective in making up the loss of weight than the fat of cow's milk.

FAT METABOLISM OF INFANTS FED ON HOMOGENIZED MILK

A study of the fat metabolism of infants fed on homogenized olive oil, homogenized whole milk and ordinary cream mixtures was carried out on the Boston Floating Hospital during 1915 season, by Dr. C. H. Laws of the University of Michigan, under the chief chemist, Dr. Bosworth. Through the courtesy of Dr. W. R. Bloor, Dr. Laws was allowed the use of the laboratory in the Bio-Chemical Department of Harvard University Medical School. The detailed results of these experiments will be included in a subsequent paper.

There were three observation periods (two in Case IV.), each of six or seven consecutive days, with an interval of from four to eight days of rest off the frames.

In these experiments the relative degrees of fat absorption in the three types of mixtures used was as follows:

CASE I. Homogenized Whole Milk—Whole Milk—Homogenized Olive Oil.

CASE II. Homogenized Olive Oil—Whole Milk—Homogenized Whole Milk.

CASE III. Homogenized Whole Milk—Whole Milk—Homogenized Olive Oil.

CASE IV. Whole Milk—Homogenized Olive Oil.

Objection may reasonably be made to any definite conclusions drawn from the above results—owing to (1) possible limit of error in the method of fat estimation; and to the fact that the differences in fat absorption was not sufficiently marked to be conclusive; (2) failure to estimate daily the fat percentage of the food, and the assumption that the formula was actually as calculated; (3) the artificial conditions to which the babies were subjected while confined to the frames; and (4) inevitable variations in individual conditions, which might alter decidedly the significance of the determinations.

The result of the clinical cases extending over a period of nearly five months on an average are, however, of decided significance and justify the belief that homogenization of milk mixtures and the substitution of olive oil for cow's fat offers an additional and valuable resource in infant feeding in cases of difficult digestion with malnutrition. The efficiency of such mixtures would appear to be due either to the quality of the olive oil fat, or to the absence of certain harmful ingredients of cow's fat. The process of homogenization is merely a means of mechanically subdividing the fat so that it may be efficiently utilized in the processes of digestion.

EXPLANATORY NOTES ON FEEDING CHART

No. 1. Rueter—A normal feeding case. Cow's milk modification throughout; homogenized in the second period, showing approximately the same rate of gain in the second half year as in the first six months.

No. 2. Bartlett—A normal feeding case, cow's milk throughout, homogenized in the second period with increased rate of gain.

No. 3. Dutch—Previous feeding, twenty-five months, with average gain of 3½ ounces per month. Homogenized cow's milk mixtures tried with no gain in weight. Homogenized olive oil mixtures for twelve months, with an average gain of 17 ounces per month.

No. 4. Forbes—Previous feeding of twenty months with average gain of 8.6 ounces per month. Homogenized olive oil for five months, with average gain of 12.5 ounces per month, during which time child had measles and pertussis.

No. 5. Watts—Pylorospasm—Previous feeding three months, with average gain of 17 ounces per month. Homogenized olive oil for six and one-half months, with average gain of 15 ounces per month, during which time the baby had one attack of bronchopneumonia and two attacks of influenza with bronchitis.

No. 6. Hanly—Pylorospasm—severe. Previous feeding three and one-half months with an average loss of 3 ounces per month. Homogenized olive oil two and one-half months with the average gain of 29 ounces per month. Vomiting finally stopped.

No. 7. Kelley—Pylorospasm—Previous feeding six months, average gain of 10 ounces per month. Homogenized olive oil three months, with average gain of 25 ounces per month. Vomiting finally stopped.

No. 8. Channing—Pylorospasm—Previous feeding two months, with average gain of 10 ounces per month. Homogenized olive oil, four months with average gain of 16 ounces per month. Vomiting stopped.

No. 9. MacDonald—Pylorospasm—Previous feeding fourteen months, with average gain of 6.5 ounces per month. Homogenized olive oil two and one-half months, with average gain of 14.4 ounces per month.

No. 10. Russell—Pylorospasm—Operation. Breast-fed. Vomiting continued. Five months, lost an average of 8 ounces per month. Homogenized olive oil five and three-quarters months, with average gain of 17 ounces per month. Vomiting finally stopped. For six weeks tried modified cow's milk. Vomiting, fatty stools and stationary weight recurred. Resumed olive oil milk and child gained 42 ounces in forty-seven days.

No. 11. Nelson—Previous feeding five months, with average gain of 9½ ounces per month. Homogenized olive oil three and three-quarters months, with average gain of 16 ounces per month.

No. 12. Davis—Previous feeding four months, with no gain. Homogenized olive oil six months, with an average gain of 15 ounces per month.

No. 13. Tower—Previous feeding six months, with an average gain of 12 ounces per month. Homogenized olive oil five and three-quarters months, including convalescence from severe infectious diarrhea, with average gain of 13 ounces per month.

No. 14. Di Pietro—Previous feeding six months, with no gain. Discharged from hospital unrelieved with diagnosis of fat intolerance. Homogenized olive oil eight and two-thirds months, with an average gain of 24 ounces per month.

No. 15. Kennedy—Previous feeding five and one-half months, with an average gain of 7 ounces per month. Homogenized olive oil six and three-quarters months, with an average gain of 16 ounces per month.

No. 16. Keough—Previous feeding six months, with an average loss of 3 ounces per month. Homogenized olive oil for two and three-quarters months, with an average gain of 32 ounces per month.

No. 17. Shaw—Previous feeding six and one-half months, with an average gain of 7 ounces per month. Homogenized olive oil three and three-quarters months, with an average gain of 11 ounces per month.

No. 18. Sullivan—Previous feeding eight months, with an average gain of 7 ounces per month. Homogenized olive oil six and one-half months, with an average gain of 28 ounces per month.

No. 19. Maguire—Previous feeding twelve months, with an average gain of 6 ounces per month. Homogenized olive oil two months, with an average gain of 17 ounces per month.

No. 20. Alford—Previous feeding three months, mixed breast and bottle, average loss of 8 ounces per month. Homogenized olive oil seven months, with an average gain of 21½ ounces per month.

No. 21. Di Natalie—Previous feeding two months, with an average gain of 13 ounces per month. Homogenized olive oil one and one-quarter months, with an average gain of 21½ ounces per month.

No. 22. Giles—Previous feeding five months, with an average loss of 4 ounces per month. Homogenized olive oil two and one-third months, with an average gain of 32 ounces per month.

No. 23. Sheehan—Previous feeding three and three-quarters months, with an average loss of 7 ounces per month. A distinct case of fat intolerance. Homogenized olive oil seven months, with an average gain of 24 ounces per month.

No. 24. Doran—Previous feeding four months with no gain. Homogenized olive oil four and one-half months, with an average gain of 10 ounces per month. Child died suddenly of unknown cause.

No. 25. Maddox—Previous feeding four months, with an average loss of 13 ounces per month. Homogenized olive oil three months, with an average gain of 21 ounces per month.

No. 26. Magill—Previous feeding two months, with no gain. Sent to the hospital for pyloric stenosis. Homogenized olive oil one month, with a gain of 31 ounces.

No. 27. Meroth—Previous feeding two and one-half months, with an average loss of 2 ounces per month. Homogenized olive oil two and one-half months, with an average gain of 8 ounces per month.

No. 28. McKenzie—Previous feeding five months, with an average gain of 5½ ounces per month. Homogenized olive oil four months, with an average gain of 24 ounces per month.

No. 29. Nichols—Previous feeding eight and one-half months, with an average gain of 6 ounces per month. Homogenized olive oil twelve months, with an average gain of 8 ounces per month. Persistent vomiting immediately relieved. Progress slow, but final result good, with child on general infant diet.

No. 30. Olsen—Previous feeding eleven months, average gain of 15 ounces per month. Homogenized olive oil five months, with average gain of 18 ounces per month.

No. 31. Pistolozzi—Previous feeding nine months, with a gain of 1 ounce per month. Homogenized olive oil one and one-half months, with an average gain of 10 ounces per month, when the child developed pneumonia.

No. 32. Gershonowitz—Previous feeding two months, average gain 6 ounces per month. Homogenized olive oil two and one-quarter months, with an average gain of 30 ounces per month.

No. 33. Williams—Previous feeding four months, average gain per month 13 ounces. Homogenized olive oil two and three-quarters months, during which the baby had a green stick fracture, acute otitis media and measles, average gain 10 ounces per month.

No. 34. Roachford—A case of congenital syphilis. Previous feeding three months, average gain 4 ounces per month. Homogenized olive oil one month, gain 8½ ounces.

No. 35. Barry—Previous feeding five and one-half months, average gain 15 ounces per month. Homogenized olive oil six and three-quarters months, average gain 18 ounces per month.

No. 36. Mulvee—Previous feeding seven and one-half months, with an average gain of 12 ounces per month. Homogenized olive oil one and one-half months, with an average gain of 13½ ounces per month.

No. 37. Klibanoff—Previous feeding on breast milk three and three-quarters months, average gain of 8⅗ ounces per month. Homogenized olive oil two weeks, gained at the rate of 30 ounces per month. (Subsequent gain in the last six weeks at the same rate.)

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THE VALUE OF PROLONGED REST IN THE TREATMENT OF HEART DISEASE IN THE YOUNG—G. D. Barton (Lancet, 1915, Vol. II., p. 602) based this paper on five years' results of a cottage home for the treatment of valvular disease in boys. It has been found that if the heart lesion has been brought on by chorea the cases do not do so well as those where valvular trouble due to acute rheumatism is being dealt with, and this may be attributed to the impossibility of keeping the boy quiet enough with other boys playing around him. The success in the majority of cases appears to be due more to prolonged rest, good food and country air than anything else, digitalis and other heart drugs being occasionally required.—*British Journal of Children's Diseases.*

A GROUP OF CASES OCCURRING SIMULTANEOUSLY IN ONE FAMILY*

BY P. J. EATON, M.D., AND E. B. WOODS, M.D.

Pittsburgh, Pa.

On February 2, 1916, we were called to see a little girl, Margaret G., nine and a half years old, who had had a rather severe cold, with harsh cough, for a few days. Upon examination we found a characteristic throat, Koplik spots, a conjunctivitis, and the beginning of a measles rash behind the ears, on the cheeks, and on the neck. Temperature 101$\frac{3}{5}$°. On February 3d, patient was well covered with typical rash, but the cough was less severe. On February 4th, mother reported that the cough had been more severe during the night, and she thought the child had whooped once. The mother was on the watch for this development, as the other children, as will be later noted, were about half way through an attack of pertussis. The patient was at once put upon bromoform (C. P.), and the dose ordered increased a drop daily. On the 7th she was coughing pretty hard. Had had a little earache the night before, but a five-cent solution of pure carbolic in C. P. glycerine took care of this trouble. On the 8th the paroxysms of coughing being severe, though not unduly frequent, pertussis vaccine was given, and was repeated in increasing doses on the 10th and 12th. The bromoform was also increased, as the child began to complain of soreness in her chest wall. On the 12th we noted that all traces of the measles had gone, and that the child was much better, and this improvement, even to the cough, continued. Again on the 18th or 19th the child complained of the discomfort of even the few paroxysms of coughing with which she was still troubled, and was instructed to wear a tight six-inch belt of canton flannel around chest, covering the surface from the nipple lines, horizontally, downward. Examination at this time showed a bulging of the lower chest wall, more marked on the left, and a seeming dislocation of the anterior parts of the lower attached ribs to their cartilages. The malposition could be easily reduced by pressure of the hands, and apparently no function of other parts was interfered with. Under increasing doses of bromoform, the cough rather quickly ended, and by the end of the month the child had only an occasional paroxysm of coughing with no whooping and had begun to improve in color, appetite and weight. Her chest deformity diminished slowly, and she is now in almost normal condition in every way, though there is still a little deformity on the left side.

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* Read at the Twenty-eighth Annual Meeting of the American Pediatric Society, held at Washington, D. C., on May 8, 9 and 10, 1916.

Just a word as to her treatment. The measles was treated by the exhibition of plenty of cool, fresh air, night and day, and she occasionally had a simple cough mixture up to the time the bromoform was started. This latter remedy was pushed to the point of fair control of the disease, and as rapidly as possible. The first injection of vaccine contained 430,000,000, the second, 860,000,000, and the third, 1,290,000,000. Saccharated iron was the tonic used subsequent to the bromoform, and seemed to be efficient in building up her hemoglobin.

On February 2, 1916, while visiting the patient whose record has just been given, we heard some most violent paroxysms of coughing, accompanied with very marked whoops. Upon going into the next room, we found this patient, aged five years, and his brother, aged two years, coughing and whooping violently. They had had this type of cough at least ten days, and no treatment had been given. Both patients were put upon bromoform in increasing doses, and the response of this patient, James, was very prompt. His cough soon became less frequent and less severe, but because of the exposure to measles, he was given one or two injections of vaccine, about 275,000,000 and 550,000,000 respectively. He was daily examined for measles signs, but developed none, and soon was well. His bromoform was diminished in about the same way as it was increased, until he was fully recovered. Shortly after he was pronounced well, he had some rheumatic pains in the joints of his legs and arms, which promptly disappeared under aspirin. He has remained well up to the present time.

As has been related, the two-year-old, Paul, was suffering on February 2d from a severe attack of pertussis. His bromoform was increased as rapidly as possible, just keeping him on the verge of drowsiness. Because we were expecting measles in his case, and because he was not robust, we gave him three doses of vaccine of 170,000,000, 340,000,000, and 510,000,000 respectively, to mitigate, as far as possible, the dangers which might come from a later combination of pertussis and measles.

He responded to the treatment very well, but on February 12th was well broken out with typical measles, and the measles cough was added to that of pertussis. Much trouble also was experienced from accumulations of gas in the abdomen, relieved promptly, as a rule, by enemas of glycerin and water. By the 19th the rash had faded, but the child was stupid—looked toxic—and chest was full of fine râles. On the 20th looked and acted as though he had a pneumonia but no physical signs could be elicited. Pulse was good. Was repeatedly examined by us both for signs of consolidation, but none were found. During the evening of the 21st, mother thought child was better, gave him an enema during the evening, because he was a little uncomfortable from the abdominal distention, and about midnight lay down beside him, as child was sleeping quietly. Some time later she awoke and found child apparently not breathing. I arrived soon after, but child was dead. I at once percussed the chest and found a small area of dullness at the left apex, possibly confirmatory of our idea that a pneumonia was present or developing.

These cases are presented to show how a double infection in one family may work out. The pertussis was probably brought home from kindergarten by the five-year-old, James, but Paul probably got his infection about the same time, as the school building is within a hundred and fifty feet of the house, and several hundred children pass the door each school day. Margaret probably contracted pertussis from her brothers, infecting them in turn with measles, which she undoubtedly picked up at school, measles having been epidemic in Pittsburgh since before the new year.

It is much to be regretted that an X-ray was not taken of Margaret's chest, but she could not be taken from the premises, and the weather was so cloudy and stormy that an ordinary photograph taken in the house would have been useless.

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TREATMENT OF PARALYSIS FOLLOWING ACUTE ANTERIOR POLIOMYELITIS*

BY WALTER F. SCHALLER, M.D.

San Francisco, Cal.

Mr. President and members of the Pediatric Society: I should have more properly made the title of my paper "The Medical Treatment of Paralysis Following Acute Anterior Poliomyelitis," as I am treating this subject from a purely medical and not a surgical viewpoint. I wish to state here, however, that I am entirely in accord with proper surgical and orthopedic treatment of this condition, but in this paper I wish to make a plea for the systematic and early treatment of the paralysis by electricity, massage, cupping and muscle-training, besides the attention to general treatment and general hygiene.

I shall not discuss the etiology and prophylactic treatment of this affection and will just touch upon the pathology. The nervous involvement consists of a degeneration of the anterior horn cells of the spinal cord and is therefore a lower motor neuron type of disease and in this respect presents a similar picture to peripheral motor nerve paralysis. The picture is one of a flaccid paralysis of an extremity or of certain muscles, with atrophy and degeneration of the nerves and muscles which show reaction of degeneration to the electrical current. The paralysis is never a spastic one, and if the picture is one of spasticity it is always due to secondary contractures and not to pyramidal tract involvement. I mention this point because in old cases contractures may attain such a degree as to simulate cerebral disorders. When we then have a lower motor neuron condition before us and a fairly clear history of an acute febrile attack in a child the diagnosis becomes almost certain—far easier indeed than a diagnosis of the disease in the febrile stage. A rational treatment as I wish to here outline, now depends on an exact notion of the muscles and nerves affected and the extent of this involvement, so I will now consider the paralysis from the amount of disability and the behavior of the electrical reactions.

In older children a notion of the amount of paralysis may be obtained by volitional movements; in fact several years ago in

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* Read at the California Pediatric Society, Northern Branch, Sept. 25, 1915.

Lorenz's Clinic in Vienna this method was used in preference to the data obtained from the electrical reactions. In younger children by questioning the parents, the nurse, etc., valuable data may be gotten as to the amount of the paralysis, but after a muscle or a nerve is involved the only exact notion that we have of the extent of this involvement is obtained from electrical reactions. We speak of a normal electrical reaction; of hypo and hyper-excitability; of incomplete reaction of degeneration, and of complete reaction of degeneration. We shall concern ourselves with these two latter reactions. I shall designate complete reaction of degeneration in this paper where the faradic excitability has been lost and the galvanic current shows a pronounced slowing with or without inversion of the formula; and incomplete reaction of degeneration where the faradic excitability is preserved, but where the galvanic current also shows slowing, with or without inversion of the formula. For testing these reactions as well as for giving treatment with the faradic and galvanic currents, a Gaiffe apparatus is employed similar to that in use at the Salpetriere in Paris. The interruption in the faradic current occurs in the primary coil—a matter of considerable importance for diagnostic work. The street current is used as a source of the galvanic current but when possible the chemical current is to be preferred, because of the greater comfort with which a considerable amount of current may be borne. The milliampere meter should be used to determine the amount of the current used and suitable electrodes are important for the testing out of the different muscles and nerves. In testing the muscles for the reactions of the faradic current—which current was first used by Duchenne of Bologne in this affection, the unipolar or bipolar method may be used. In certain muscles which react only to a considerable amount of current it would be advisable to use the bipolar method. For this purpose two olive pointed hand electrodes are placed along the course of the muscles to be tested. It is only possible at times to demonstrate the faradic excitability of a muscle by this means as in the unipolar method, *i.e.,* where the indifferent electrode is placed at some point upon the back and the examining electrode over the motor point, the transmitted impulse causes other muscles to contract to such a degree that the reaction of the muscle in question is masked. Another point is also important: In a badly affected muscle the motor point is often displaced so that the ordinary chart for guidance in testing the electrical reactions is not always to be relied upon. For the accurate estimation of the character of the reaction and the amount of current—both faradic and galvanic—a special record chart is used which permits of an accurate means of keeping track of the progress of the case. Considerable patience is required in young children to obtain accurate electrical reactions, as the children are easily frightened, and when the galvanic current is used in any considerable amount, it is painful. We, however, arrive in most cases at a result after a few trials. The prognosis in the cases depends a great deal on the nature of the electrical reactions. In general it may be said that in complete reaction of degeneration the prognosis should be guarded, although many of these cases recover function. Cases which show incomplete reaction of degeneration generally recover. In cases which show reaction to both forms of current, no slowing but only hypoexcitability, recovery is practically certain. It is to be recalled that the electrical reactions in muscles are only reliable for diagnostic and prognostic purposes a certain time after the onset of the paralysis (Erb). Some observers have stated that electrical treatment may be begun immediately after the febrile attack, and to this I agree, using a mild galvanism. The rule is to use the current to which the muscles respond. In incomplete reaction of degeneration the slow, interrupted faradic current may then be used at once. Only such amount of current is used to produce a muscular contraction. In complete reaction of degeneration the interrupted galvanic current is employed, and here again only such amount of current is used as will produce muscular contraction. The polarity of the hand or treatment electrode depends on the reaction formula—when there is inversion of the formula the positive pole should be used, as it requires a less amount of current than the negative pole to produce muscular contraction. Muscular contraction usually may be obtained with 3 to 10 milliamperes of current but in some cases one requires as much as 15 milliamperes, seldom more. Treatments are usually given three times weekly, the time of each treatment varying with the number of muscles to be exercised—ten to thirty minutes. For the parents and attendants who are called upon to assist in giving these treatments a chart may be used marked with the motor points for the muscles in the individual case. The parents often ask whether they cannot give these treatments to the children at home on account of the time and expense involved and the long duration of the treatments. This is not generally practicable because of the complexity of the electrical apparatus and the lack of technical and medical knowledge which is necessary for its use. In the faradic coils in general use, no provision for interruptions in the primary coil exists; and in the use of the galvanic current constant care must be exercised to avoid burns. Strict supervision must be exercised over these treatments in order to attain the best results and we believe that a number of failures are due to this lack of supervision, and observance of the general rules of treatment here outlined. It is often striking to note the improvement after the first few treatments—this is particularly noticeable in other nerve palsies such as facial paralysis (Bell's Palsy). The question arises as to whether electrical treatments should be used in cases where the attack dates back a number of years. I would state that treatment should be given a trial. Even where no response is obtained from the galvanic current I believe that treatment should be given over a period of three or four months in the effort to stimulate muscular contraction. If at the end of this time there is no electrical response the case may be considered hopeless from the standpoint of ultimate function. I stated at the beginning of this paper that I am heartily in accord with all surgical and orthopedic means of treating these cases. As an axiom, however, I hold that in recent cases where orthopedic appliances are necessary electrical treatments are likewise necessary. I will go further and state that the application of braces only, which you will all admit has its object in the correction of deformity, rather than in the cure of deformity, may indirectly harm a group of paralyzed muscles by withdrawing these muscles from proper treatment and exercise. For instance, in spanning a paralyzed muscle all action, spontaneous or induced, may be taken from this muscle and a condition of atrophy supervenes where no electrical reactions may finally be obtained because there is no muscle left for a contraction to take place.

The high frequency current, sinusoidal current, etc., have been advocated for the treatment of paralysis following acute anterior poliomyelitis. I have had no experience with these forms of treatment. It is the opinion of Dr. Francis X. Dercum that they are not as valuable as the method in question. At least it will be necessary to follow a series of cases to throw any light on this point. The treatment here outlined is rational—it is assumed that not all the nerve cells to a certain muscle or a group of muscles are paralyzed; that there are certain cells which carry on the function of the muscles or some of its fibres if even to a small degree. It is the object of the galvanic and faradic stimulation to hypertrophy these cells and to make them carry on a greater function. I am dwelling on this point of electrical treatment because I know that there are many physicians and perhaps a number present who doubt the usefulness of electrical treatments. I am myself convinced of the efficacy of electrical treatment in paralysis following acute poliomyelitis. The history of the cases which I shall present to you will give support, I believe, to this opinion. I would state that the parents who bring their children for treatment often at a considerable sacrifice of time, trouble and expense are themselves satisfied with the progress their children are making.

Massage and passive motion are given every other day, alternating with electrical treatments. They have for their object the maintenance of nutrition, volume and tone of the muscles. Care should be used to avoid stretching the muscles and to avoid hyperflexion and hyperextension of joints.

The parents are instructed to have the children practice volitional associated movements or muscle exercises. It is an attempt to influence and stimulate the anterior horn cells from higher nerve centers. If even a small degree of movement be present the muscles are exercised daily to increase this range of movement. If no movement is present attempts at movement by effort of the will are practiced by performing similar movements with the corresponding normal muscles on the other side of the body.

We employ dry cupping of the spine as a hyperemic treatment and believe it to be particularly useful in recent cases. Daily or on alternate days the cups are applied laterally to the spinous processes on the paralyzed side at a level of the spinal segments of the cord corresponding to the motor roots of origin of the paralyzed nerves.

The paralyzed extremities should be kept warm, particularly in the winter months of severe climates. Dr. Francis X. Dercum lays considerable stress on this point and recommends the wearing of a lamb's wool covering when out of doors.

It is hardly necessary to call attention to the general health and the general hygiene of these patients, although they are as a rule quite normal little people with the exception of their deformity. Following the febrile attack strychnia and arsenic and iron may be given and the strychnia continued for a considerable time; but internal medication has a very unimportant place in the treatment of a disease where the lesion is a destruction of nerve cells which do not regenerate, and the object to be attained is the stimulation of the function of the cells which remain.

CASE REPORTS

CASE I. I. S., Dispensary No. 14,222—Neurological Clinic, Stanford Medical School. Attack of acute anterior poliomyelitis in 1910 at the age of one year. Both legs were paralyzed, also right arm. Child was very slow in learning to walk. Although it could stand with support it was not able to stand unsupported until about six months ago. The child first reported to the clinic in 1911 and the condition was diagnosed as paralysis following acute anterior poliomyelitis, but it was not until September, 1912, about two years and a quarter after the febrile attack, that the patient came for treatment. She was treated by electricity for six months without apparent benefit. Patient then returned to the clinic in April, 1914, for further advice and treatment. This was nearly four years after the onset.

A picture of the child was taken at this time, showing the extensive involvement of the leg muscles. The child could not stand unsupported. Pes valgus right foot and pes varus left foot. Electrical reactions showed that the tibialis anticus, extensor longus digitorium, extensor proprius hallucis did not respond to the faradic current on the right side—*i.e.,* reaction of degeneration complete. On the left side there was profound involvement of all the muscles except the flexor longus digitorium and flexor longus hallucis, which responded to the faradic current.

Regular treatment along the lines mentioned was now instituted and is still continued. Examination September 23, 1915. Patient can walk unsupported and without braces. There is no shortening of the leg most affected, measured from the anterior superior spine to the internal malleolus. Movements on the right side; there is no longer drop foot and the patient can perform dorsal flexion. There is no longer pes valgus of the right foot. Plantar flexion of the left foot is possible, due to recovered action of the soleus and gastrocnemius muscles. Electrical reactions. There is no longer reaction of degeneration in the antero-lateral group of the right leg, and on the left side faradic response is present on stimulation of the calf muscles.

Summary—Systematic treatment instituted in this case from July, 1914, *a lapse of over four years after the attack* of acute poliomyelitis, resulted in return of function in the tibialis anticus, extensor longus digitorium and extensor proprius hallucis muscles on the right side; and the foot assumed a normal position from the pes valgus position. On the left side the calf muscles recovered partial function. The child can now walk satisfactorily with braces.

CASE II. L. D., Dispensary No. 490—Neurological Clinic, Stanford Medical School. Patient came to the clinic in February, 1913, at the age of four years, with a history that at one year of age she was paralyzed in the left leg following acute anterior poliomyelitis. She was treated by braces only. Examination three years after attack showed considerable atrophy of the left lower leg and great hyptonicity of the calf muscles, permitting the foot to be dorsally flexed to an abnormal degree. The electrical examinations showed no response to either galvanic or faradic currents in the calf muscles. No note of movement of foot in plantar flexion. Child was then treated at the Neurological Clinic for a period of nearly three years following. Status taken September 24, 1915, gives the following results: 1 c.cm. shortening of the left leg. The left calf measures 4½ c.cm. less than the right but in the last two years the growth of the left calf muscles have kept pace with the right calf muscles and the same relative measurements exist. The leg muscles now functionate, and the calf muscles respond promptly to the galvanic current, and also to the faradic current. There is no longer reaction of degeneration in these muscles. The hypotonicity still exists but the tendo-achilles can be felt to contract with muscular effort.

Summary—Treatment of nearly three years' duration *after a lapse of three years after the attack,* resulted in considerable recovery in function of calf muscles. A shortening of the achilles tendons to avoid stretching of the calf muscles to reduce deformity would now seem to be in order. The mother states that she now sees improvement from "month to month."

CASE III. E. C., Dispensary No. 16,291—Neurological Clinic, Stanford Medical School. At the age of three years and nine months patient had an attack of acute anterior poliomyelitis in

June, 1914. Patient reported to the clinic two weeks after the onset of the paralysis with drop foot, paralysis of the plantar flexors of foot (calf muscles), of external rotators and abductors of thigh on pelvis and of flexors of leg on thigh, the disability being limited to the right lower extremity. The electrical reactions were made and complete reaction of degeneration was found in the calf muscles and muscles on posterior aspect of thigh—biceps, semi-tendinous and semi-membranosus. The muscles on the antero-lateral aspect of the leg showed incomplete reaction of degeneration and the prognosis of these muscles was good, a note being made that recovery would take place in this group, the prognosis of the other affected muscles being guarded. Treatment was immediately begun and regularly followed up to the present time and still continues. An examination made September 20, 1915, presented the following condition: No difference in the length of legs. Very slight dorsal flexion of foot is now possible. Flexion of leg on thigh is now possible shown by contraction of internal and external hamstrings. Plantar flexion of foot not possible. *Gait*—The gait in this case is peculiar and characteristic. The whole right lower extremity is raised, thrown forward and everted, the foot being placed flatly and forcibly on the ground. The pelvis does not appear to be raised to any extent in this manœuver, but the gait may be explained by weakness of the dorsal flexors of the foot and weakness of the internal rotators and abductors of the thigh. I do not recall that this particular gait has been described, but I have seen it in a number of cases and would now call attention to it as worthy of consideration from the point of view of working backwards to an exact muscular involvement and dependent therapy.

Electrical Reactions—No reaction to faradic current in anterolateral group by unipolar or bipolar current. Calf muscles and anterior and posterior thigh muscles react to faradic current.

Summary—The faradic excitability has returned in the posterior thigh muscles and in the calf muscles. Slight dorsal flexion of foot is now possible. It appears paradoxical that the faradic current cannot be obtained at present in the anterolateral group when it was noted present on the previous examination. Motor power, however, returns sometimes before electrical excitability and it may be so in this case. The prognosis now is good for complete recovery.

CASE IV. E. S. McM.—Attack of acute anterior poliomyelitis in July, 1913, at five years of age. All muscles of the right upper extremity were involved—all of the arm muscles proper in addition to the deltoid, triceps and biceps. Motor paralysis was absolute and the reaction of degeneration complete in all paralyzed muscles. The arm was entirely flaccid and the tendinous reflexes were absent. Sensibility, however, was intact. Treatment was begun in October, 1913, the prognosis being poor on account of the severity of the paralysis. On July 8, 1914, faradic stimulation showed response in the flexors of fingers near the wrist—displacement of motor point. It was noted that a less amount of current gave increased action in the affected muscles. There was no return of voluntary movement of the fingers or of the forearm. A status in September 27, 1915, shows no recovery in movement *but all the muscles responded promptly to the galvanic current.* There has been no shortening of the right arm, and the temperature of this arm has increased to almost normal. The mother and others have noticed at times what they considered a slight flexion of the fingers. There have been no contractures. Prognosis here is poor. There may be return of function in the flexors of the forearm but this is not certain.

Summary—A child with a severe involvement of the right upper extremity in whom treatment was instituted during a period of over two years, with the result that shortening and deformity have been avoided and the muscle fibres preserved so that all the muscles respond to the galvanic current. Return of faradic excitability in the flexors of the forearm.

INTESTINAL PARASITES IN CHILDREN—Examining 665 children in Alabama, 80 of whom were negroes, and all under twelve years of age, G. J. Greil (American Journal of Diseases of Children, 1915, Vol. X., p. 363) finds that parasitic infections in children are far more common than has heretofore been thought. While hookworm infection is the most often found, *Hymenolepis nana* and *Trichocephalus dispar* are by no means rare. Less than 10 per cent. of the cases infected complain of symptoms referable to the infection. By routine examinations, many cases will be found otherwise unsuspected and by thorough treatment their general condition will be greatly improved.—*The American Journal of Obstetrics.*

CREOLIN IN SCABIES IN THE INFANT *

BY DOUGLASS W. MONTGOMERY, M.D.

San Francisco, Cal.

Scabies in the infant has some peculiarities calling for a non-irritating parasiticide, and it is just in this respect that creolin is admirable.

References to creolin in therapeutics are rare. One of the very few I ran across was in a small book by Ledermann, who mentioned a mixture of creolin and olive oil (2-100) as being suitable in scabies and in morpiones.† It is a blackish-brown, oily fluid, with a tarry odor, soluble in chloroform, ether and alcohol and giving a milky emulsion with water. It is an effective, innocuous antiseptic, and, as we shall see later, it and its associated preparations, although infrequently mentioned in medical literature, have a wide use in medicine, in industries and in public hygiene.

Rabelais, in speaking of vermin, whether black, yellow, grey, tan-colored or swarthy, says they are importunate, tyrannical and troublesome, and as regards scabies these disagreeable characteristics are exhibited in a high degree, especially when present in the infant.

Scabies in the infant, instead of being confined to the classical situations, as observed in the adult, tends to spread all over the body, limbs and face. Furthermore, at this tender age, there is a natural inclination to eczema, and an equally marked susceptibility to pyogenic infection, and these, together with the symptoms proper to the itch mite, often develop a picture of extreme misery and discomfort. Besides this, scabies, from its very nature, is more difficult to cure in two closely associated human beings than in one, because in one of the two the treatment is apt to be less effectively thorough, and effectiveness and completeness are the very essence of the treatment. In fact, in scabies in the infant there are usually included in the circle of influence even more individuals than two; the father of the family and other children, in all of whom a thorough annihilation of the acarus is imperative if a recrudescence is to be avoided.

* Read at the California Pediatric Society, Northern Branch, Sept. 25, 1915.

† Therapie der Haut u. Geschlechtskrankheiten, von Dr. R. Ledermann, 1912, S. 119.

Sulphur, take it all in all, is the best remedy for scabies, but it is highly irritating for some skins, and frequently very irritating indeed to the sensitive skin of the infant. In such instances, as a natural consequence of its severity, the remedy is apt to be applied incompletely and tentatively, and may, therefore, act as a tantalizing irritant without achieving a cure.

Under such circumstances balsam of Peru is excellent, as it is a good acaricide, slightly antipruritic, antipyogenic, and bland and non-toxic to the skin. Balsam of Peru is, however, difficult to obtain absolutely pure, and even when so, it is always to be regarded as only a substitute for the more effective drug, sulphur.

Betanaphthol, as a salve, 100-150, is a fine antiscabetic, and makes a clean, odorless ointment. It is a sort of Siamese twin of phenol, and a near relative of the cresols, which will be taken up later in considering the constituents of creolin.

Unfortunately, in several instances, betanaphthol, when employed for scabies, has caused death, and its use over such an extensive surface as that involved in scabies is now abandoned by almost every well-known dermatologist. If it can be so toxic in the adult, there is all the more reason why it should not be prescribed for the infant.

One of the best reports of this accident was given by Hjalmer Petersen, who saw several severe poisonings by it. There was one death in an infant of three months, following the employment of a 2 per cent. naphthol salve.*

My first acquaintance with the good qualities of creolin came about almost by accident. Some years ago, while passing through Dresden, I called on J. Werther, who invited me to see his clinic in the city hospital. While viewing a patient with scabies, Dr. Werther rather pointedly remarked that creolin was of decided value in this disease, and on my further inquiry he gave me the following prescription:

℞	Creolin	10.00
	Sapo. viridis	30.00
	Adipis benzoati ad	100.00

M. Sig. Rub in once a day.

The green soap adds to the penetrating qualities of the preparation, but it is not a necessary ingredient, and may be undesirable as drying and irritating to the tender infant skin.

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* Zur Behandlung d. Kratze von Hjalmar Petersen, Hospitalstidende, 1911, No. 22, p. 597-601. Abstract in Archiv. f. Derm u. Syph., February, 1912, S. 182.

Creolin owes its effectiveness to the presence of tricresol. These three cresols are the isomeric methylated benzine alcohols that occur associated with phenol in coal tar and in creosote. In fact, the name cresol is an abbreviation of creos-ol, meaning the alcohol of creosote. The cresols are very widely distributed in nature. Two of them, para- and ortho-methylated oxy-benzol, occur in the urine. It is doubtful if meta-cresol has ever been found there. The three cresols, ortho- meta- and para-cresol, are by no means of equal value as antiseptics, as meta-cresol is by far more powerful than either of the other two. Pure tricresol is a clear, oily liquid, soluble in water to the extent of 2 per cent., and very slowly diffusible. If, for instance, pure tricresol is dropped into water it instantly sinks to the bottom of the glass, where it rests as a beautiful, clear, egg-shaped mass. The preparation called creolin, however, when dropped into water quickly diffuses, making a milky mixture, which may be highly diluted and yet retain its insecticide quality. It is this that renders creolin so cheap in the commercial uses to which it is put in destroying mosquito larvæ and the insects that infest chicken-coops.

The correct saponifications of cresol to make creolin and so render it readily diffusible, constitute trade secrets that must, however, be well known to the drug trade in general, as almost every large firm gets out its own brand. A few years ago, while down in Panama, Mr. LePrince gave me the formula for one of the best of the larvacides used in combating mosquitoes, and it serves as a good example of how this saponification may be attained.

One hundred and fifty gallons of crude carbolic acid of a specific gravity of not greater than 0.96 and containing not less than 15 per cent. of phenols and cresols, is heated to the boiling point of water, when 200 pounds of resin is added and constantly stirred until dissolved. Then 30 pounds of caustic soda is added. The mixture is kept at the boiling point of water and stirred until it is a solution, when tests of a small portion in a test tube are made with water until perfect emulsion is attained. The larvacide is then ready for use.

There is also a saponification of cresol included in the United States Dispensatory called liquor cresolis co., which is supposed to take the place of lysol. Practical druggists, however, say that the formula is faulty, and that the article turned out in following its directions is never an excellent one. In the British Pharmacopœia there is a liquor cresol saponatus which contains 50 per cent. of cresols, with sufficient soap to make it mix freely with water in any proportion.

Creolin, lysol and liquor cresolis co. are all saponifications of tricresol, yet they are all unlike. Lysol, for instance, although an excellent antiseptic, has a strong, penetrating, clinging odor, quite disagreeable in a salve, while the odor of creolin is not nearly so disagreeable.

The antiseptic value of any of these preparations will, of course, greatly vary according to the varying proportions of the very antiseptic meta-cresol contained in them. There is yet another consideration, a general one, in the employment of creolin in scabies. A physician must be always on his guard for idiosyncrasies or disagreeable by-effects from his drugs, and when the surfaces treated are so great as they are in scabies, and the drugs employed may be so irritating, it is well to have in mind a preparation to use as a relief from the one originally prescribed. For example, it is an experience as old as the practice of medicine that sulphur will keep up an irritation of the skin for long after the disease, scabies, for which it was originally prescribed, has been killed out. It is, therefore, a great comfort under such circumstances to be able to shift to another excellent insecticide such as creolin.

PREVENTION OF SERUM ANAPHYLAXIS—Koch (Berlin. Klin. Woch., June 21, 1915) relates that the preliminary subcutaneous injection of 5 c.c. of antitoxin a few hours before the regular dose does not always ward off serum anaphylaxis. He reports the sudden death of a child of six, with scarlet fever and diphtheria, at once, after injection of antistreptococcus serum, after a preliminary small injection. The child had been injected with diphtheria antitoxin the third and sixth days of his illness, and the intravenous antistreptococcus serum injection was given the twentieth day. Nothing could be found to explain the sudden fatality but anaphylactic shock, except that the child was debilitated, its resisting powers at a low ebb. In such cases serotherapy should be applied with special caution. It is possible, Koch remarks in conclusion, that it would be wiser to leave an interval of twenty-four hours between the preliminary and main injection of serum.—*Journal of American Medical Association.*

USE OF EIWEISSMILCH *

BY LEO L. MEININGER, M.D.

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It is not with the thought of bringing something new before you that I am presenting this paper, but it is with the object of bringing before you my experience in the use of eiweissmilch and the deductions that I have accepted. I have used it more or less for the last three and one-half years, and during most of this time, not with the good results with which I had seen it used by others, but rather with failure. It is only since the first of this year, since I have carefully superintended its preparation, that I have had the results that prompted me to pointedly call your attention to its value.

For years physicians working on the problem of artificial feeding of infants during intestinal and nutritional disturbances have presented to us their corrections and findings, and at sometime trying to prove that these disturbances were due either to one or the other of the main factors of the constituents of milk, *i.e.*, the protein, fats or carbohydrates.

About five years ago it was left to Finkelstein to bring before us the fact that the most constant cause of intestinal and nutritional disturbances was an intolerance of carbohydrates in the intestines, producing an abnormal fermentation. This was due to feeding a milk with a relatively high sugar, high salt, low casein and a combination of relatively low fat and low calcium. By the introduction of his eiweissmilch he presented us a food (1) low in sugar, (2) low in salt, by the dilution of the whey, (3) high in protein, (4) a combination of relatively high fat and high calcium. The original whole milk used by him contained: Fat, 3.5 per cent.; sugar, 4.5 per cent.; protein, 3.0 per cent.; ash, 0.7 per cent. His eiweissmilch, he found, contained 1 per cent. less of fat, 3 per cent. less of sugar, same protein, and 0.2 per cent. less of ash. Of course at different times these percentages have been disputed by others, but nevertheless the majority of observers have accepted them.

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* Read at the California Pediatric Society, Northern Branch, Sept. 25, 1915.

For quite a while this preparation with these differences in the percentages of the different constituents of milk was not popular for general use, and, furthermore, all the results obtained by Finkelstein were not obtained by others. Particularly was it noticed, if the infant was kept on this mixture for any length of time, that whereas the intestinal disturbance was corrected, the child seemed rapidly to lose in weight. Outside of this, other very important facts were presented against its use. It was too costly, it was difficult to prepare, and, when fed to older infants, it was hard to feed on account of its disagreeable taste. Some time later Finkelstein likewise became convinced of the fact that there was a great danger in too complete or prolonged withdrawal of carbohydrates. He found, as others had found, that this original eiweissmilch led to a marked initial loss of weight with later stationary or gradual loss of weight. So at the present time the eiweissmilch is made to contain from 1 per cent. and, later, up to 3 per cent. and more of sugar.

With this change in the gross preparation of the food we have an ideal food which I believe to be indicated in nearly all disturbances of infants accompanied by diarrhea, including bacterial enteritis, and also in all nutritional disturbances not reacting to other forms of artificial feeding.

The objections to its *general* use to my mind are that it requires great care in its preparation and is very costly. With these two objections before me I have been unable to advise its use with clinic patients.

There have been in the last year or so a number of foods presented to take the place of eiweissmilch, but I believe the only one which gives the good results is a preparation called larosan, offered by Stoeltzer of Halle.

The cases which I have treated in the last eight months were cases mostly from my private practice and a few hospital cases. They were infants ranging from seven weeks to sixteen months, inclusive. The conditions were those of intestinal derangements and were classified as (1) those without toxic symptoms, (2) those with toxic symptoms.

The principal symptoms of the first group were loss of weight, or stationary weight with green acid stools containing mucus. Those of the second group had fever, restlessness, loss of appetite, frequent green acid stools containing mucus, sometimes blood, and, likewise, loss of weight.

I proceed in the treatment of these two groups of cases as follows: In the first group, I give weak tea or water for from twelve to twenty-four hours. I then begin on eiweissmilch without the addition of sugar for the first twenty-four hours. I then add sugar to 3 per cent., and I add this irrespective of the frequency or character of the stools. In a few days the stools begin to become large, soapy and of proper consistency.

In the second group of cases I give an initial dose of castor oil, and then feed on weak tea for twenty-four to thirty-six hours. I then begin the eiweissmilch for twenty-four hours without sugar and then begin to add from 1 to 3 per cent. of sugar. Twenty-four hours after I begin to feed eiweissmilch the weight becomes stationary and, as I add sugar, the weight begins to increase.

For the addition of sugar, I usually use dextri-maltose, which does not easily cause fermentation. I keep this treatment up from a month to six or eight weeks, according to the case, and then use my ordinary milk formulas. I have practically never had any trouble in making these changes.

When I discontinue the use of eiweissmilch the infant has had for some time large, formed stools of the proper consistency and color.

In cases of intoxication, I begin with ten feedings of 5 grams the first day, after tea diet, then I give ten feedings of 5 grams each with 3 per cent. sugar. I increase 50 grams daily until the severe diarrhea stops, after which I give 180 to 200 grams per kilogram of weight. I then begin, if necessary for weight, to increase the sugar percentage. If the body weight falls before this I begin the increase of sugar earlier. If the toxic symptoms are prolonged I only increase to 130 grams per kilogram of weight.

In the milder form of intestinal disturbances without toxic symptoms I give 300 grams of eiweissmilch in twenty-four hours and then add 3 per cent. of sugar. I then increase the daily amount without respect to stools to 22 grams per kilogram of weight.

Although frequently discussed, the conclusion of the majority of observers has been that dyspeptic conditions are an induced intolerance for carbohydrates in the intestines producing abnormal fermentation. Some years ago it was the general opinion that all the acute gastrointestinal conditions were due to an infection of the intestinal tract. Finkelstein, and later others, offered proof of the fact that whereas a small percentage are due to an infection, the large, and very large, majority of these cases are primarily due, as I mentioned before, to intestinal harm caused by relatively high carbohydrates with an overstepping of food tolerance.

The frequent acid, green, explosive stools are caused by whey concentration with the fermentative bacteria acting on the carbohydrates and mucus. These stools waste the potassium and sodium salts with a consequent demineralization and relative acidosis, which adds to the toxemia. There is also a large water loss, depending on the type of child.

Now in feeding eiweissmilch, with its large protein content, and adding to it a sugar which is not easily fermented, we get, instead of a pathologic fermentation, a condition of putrefaction, which changes the acidity of the intestinal contents to alkaline. The peristalsis is decreased, with the resulting absorption of fluid and the excretion of soapy, clay-colored, constipated stools of eiweissmilch.

In conclusion, let me say that eiweissmilch is a dietetic measure which is reliable and cures most cases of intestinal derangements in a short time. It ensures a sufficiency of food, so that the weight of the infant is considerably increased during its treatment, which was not the case when we were in the habit of treating these conditions with gruels and flour, which is a hunger diet, and with which results are obtained in spite of the carbohydrate because of the small amount of the diet given.

The chief benefits of the food are a reduction of fermentation in the intestines and a substitution for it of putrefactive changes leading to the characteristic calcium soap stools and with cessation of diarrhea and a gain in weight.

The reason favoring this change is, according to earlier publications, due to the high percentage of proteid and low percentage of salt and of milk sugar.

The theory given by some of late is that the diminution in salt and sugar and fat is of minor importance, and that the feature of albumin milk essential to its success is the high content of proteid and calcium.

THE PROBLEM OF DENTAL HYGIENE IN CHILDREN*

BY GUY S. MILLBERRY, D.D.S.

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I assume that among the several problems which, as pediatricians you are confronted with, and not in a position to do more than advise, is the care and restoration of the teeth in children.

Over a hundred years ago, Fox, in writing on the teeth, states that the first two decades in the lives of human beings are the most important because of the numerous developmental changes which take place during that time.

Dental disorders are so prevalent that we may assume that at some time or other every child is subject to them; the healthy child is the exception which proves the rule.

The serious side of the problem is naturally the gravity of the disease, that is, a child's mouth which contains many carious and abscessed teeth is a much more serious menace to its health than one with few diseased teeth.

As we are confronted with a condition which needs no further elucidation, except as to cause, we should direct our attention toward overcoming it, either by further etiological investigations and rational treatment or artificial preventive, or restorative methods.

May I prevail upon your time to briefly review some theories as to the cause of dental caries? In the time of Hippocrates caries was attributed to a disturbance of the four principal humours of the body. In the middle ages the worm theory prevailed, and various fumigations, together with the use of the actual cautery, were practiced to overcome the disease. Later we had the electrical theory, wherein each tooth was supposed to act as the pole in a galvanic battery aiding in the dissolution of the tooth, and then the chemical theory which became so pronounced that dentists believed that white decay was due to the presence of nitric acid, yellow decay to hydrochloric acid, and brown decay to sulphuric acid. This was followed by the septic theory into which the activity of germ life was introduced and, finally, the now prevailing, generally accepted chemico-parasitic theory advanced by the late W. D. Miller, an American, long a resident in Berlin. This theory assumes that many of the mouth organisms, either by the secretion of an enzyme or by metabolic processes, act upon carbohydrate food material, producing by fermentative reactions an acid, usually lactic, as one of the end products, and this acid causes the dissolution of the inorganic compounds in the tooth.

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* Read at the California Pediatric Society, Northern Branch, Sept. 25, 1915.

Some recent authors have advanced the hypothesis that caries is endogenous rather than exogenous, claiming that certain constituents of the blood stream and a modified blood pressure are responsible for the internal disintegration of the tooth substance, with the resultant cavity formation. A similar theory has been advanced by Eckerman, a Swedish writer, who bases his arguments on a variable osmotic pressure within and without the tooth, due to the presence of sodium chloride in excessive amounts in the saliva derived from the food.

These hypotheses have not been substantiated; in fact all microscopic examinations of decayed teeth give unmistakable evidence of the origin of caries on the outer surface which confirms Miller's theory.

Some recent investigations on the saliva point to a bacteriological phase of the problem which may resolve itself into the simple problem of modifying the reaction of the saliva, so that the acid-forming organisms will be unable to thrive. If the presumption can be proven and the salivary reaction modified by regulating the diet, much will be done toward preventing the inception and progress of the disease.

The prevalence of dental caries is unquestioned. The period of greatest prevalence is now being studied as one of the many children's diseases, each one of which seems to predominate at a certain age. Graphic illustrations giving the height of the curve will permit us to calculate the age of greatest susceptibility and your co-operation is to be desired in recommending preventive measures at such a time.

Dr. E. A. Bogue of New York, who is one of our best recognized authorities in orthodontics, has determined by clinical observation that when the width of the upper arch at four, five or six years is less than one and twenty hundredths of an inch abnormal occlusion will follow in every case. Another notable feature is that every contracted arch is associated with curvature of the spine in some degree. Broadening the arch to normal enlarges the nares, giving greater breathing capacity and better heart action with proportionately better health. Thus many forms of preventable dental disorders may be manifested, other than decayed teeth.

Preventive measures by the dentist should be undertaken very early in life to accustom the child to prophylactic treatment, and to overcome the fear and apprehension so prevalent in later childhood. Prophylaxis can be effectively accomplished in short sittings at frequent intervals if necessary, winning the child's confidence rather than diffidence. Differences of opinion with regard to methods of cleansing teeth and use of powders are of minor importance generally speaking, except that a little Florida water in the bath is about as efficient when compared with a bath brush and soap as a little mouth wash in oral hygiene, as compared with tooth brush and saponaceous tooth powder or paste.

Restorative methods are equally as successfully handled in as brief a space of time if the small cavities can be cared for early. You are aware of the many disorders that are attributed to dental alveolar abscesses. By far the larger majority of these are due to dead or devitalized pulps. Save the pulps and prevent the dental abscesses and subsequent disorders! The work of Billings and Rosenow presents some very convincing arguments in favor of preventive dentistry.

What shall we do to lessen the prevalence of this common disease? We are in a position to do much good in an advisory capacity. We are in a position to do much in a preventive and restorative way, but we must be in harmony if the children are to profit by our effort and experience. It is possible for us to anticipate approximately an ideal state when the percentages of healthy children, free from caries, and those suffering from caries may be reversed. I believe we should look toward this ideal. There are several positions from which we may attack the problem—first, education—second, public service—third, legislation.

Education—Literature for the children should be provided, colored by childhood fancies, making the technical subject attractive and interesting and appealing to their imagination, together with literature for the parents, devoid of technical verbiage, and illustrating, by plain analogies and photographs, the simple, every-day facts in question.

Lectures in the university and normal schools.

Lectures before parent-teachers' organizations.

Lectures before county teachers' institutes and state teachers' associations.

Papers and discussions before professional associations.

Instruction in medical schools to medical students and in hospitals to nurses, especially those who propose to enter the field of pediatrics and obstetrics.

You are in a position to recommend these measures and to urge their adoption.

Under Public Service, we may consider school and public dental infirmaries. Consulting dental surgeons and dental internes in hospitals and state institutions, particularly those caring for the younger persons.

Dental infirmaries in large department stores and factories.

Social service.

The creation of a new field of dental practitioners known, perhaps, as dental hygienists.

Research work in endowed institutions.

Legislation must be either mandatory or prohibitory and it must have a collective rather than an individual effect. Therefore, legislative methods must be very carefully studied before being proposed.

Thus, we see that there are many opportunities to disseminate knowledge looking toward prevention as well as meeting the condition in a restorative way. All of these plans are in force in one part of the country or another but not to the degree that will bring the best results.

With regard to literature, there is a marked aversion on the part of professional men to provide literature of the character required for laymen, the excuse being that it tends toward personal aggrandizement. As a result the commercial public has stepped in and endeavored to meet this demand by supplying this character of information, not forgetting in the meantime to promote their own interests.

The Metropolitan Life Insurance Company is doing educational work along these lines and its list of endorsees includes the names of many distinguished men—even organizations, such as the Oakland Traction Company, have announced their interest in preventive dentistry by published aphorisms in the daily press.

Lectures on mouth hygiene in the regular courses in hygiene in the universities are becoming more general, probably due to the interest which medical men have taken in the mouth as a focus of infection, and careful examinations of the mouths are being made in the general medical examination of university matriculants. All this tends to disseminate knowledge on the subject or create an interest.

Instruction to medical students and nurses is of the utmost importance in my opinion. It should be a prescribed rather than an elective subject, even though the course be brief.

It is probably too early to consider legislation, for all legislation in public health is either directly or indirectly prohibitive, but the time is not far distant when measures will be introduced in the form of a tax on sweets and sugars—and other forms of regulation, which will be for the common good.

Public service by the dentist is purely an economic problem. Whatever the service may be, either preventive or restorative, the question of time is the principal factor. In medical work after the first examination or operation the routine work is usually brief. In dentistry every visit generally requires an equal amount of time to render a given service, and it is because of the number of hours required to perform this service that the dentist is unable to give freely of his time. As compared with the physician, one-half of his time will not produce an income sufficient to build a home, educate his children, and provide for his retiring years, and he is, therefore, unwilling to give a half day, each day, in such service.

The problem must be met by the appointment of full time or part time dental internes at a moderate salary to perform routine work, and a consulting dental surgeon whose judgment and experience may be sought in the unusual cases; their service will have an educative value only through observation and not through instruction.

This plan can be uniformly applied to public school clinics, private dental infirmaries, as the Forsyth at Boston, hospitals, department stores, as in the Emporium in San Francisco, etc., and the sooner we make provision for, or urge the establishment of these clinics, the sooner we will reach the children.

The medical profession can materially aid in a movement now being inaugurated in the United States, endorsed by men interested in preventive dentistry but opposed by others, chiefly Boards of Examiners, and that is the inauguration of prophylactic treatment in dental offices by dental nurses, usually women. This plan accomplishes two things—it renders a satisfactory service in preventive dentistry to the dentists' clientele, at regular stated intervals, at less cost than regular dental service, both to children and adults, thus inculcating good habits in mouth hygiene on the part of the patient, and it provides lucrative employment for a better type of women. The dental hygienist, as she is called, confines her work to ordinary scaling and polishing of the teeth. Her duties in no sense involve any risks on the part of the patient, except possibly the risk of infection, which can be easily met, and she is never entrusted with the responsibilities of the medical nurse, as instanced in the use of opiates, in cases of collapse and in obstetrical work. Her greatest field of usefulness is with children, both in private practice and in school and other public infirmaries. The pediatrician is in a position to urge the adoption of this plan. The opponents of the plan fear that the dental nurse will gradually enter the ranks of the illegal practitioner of dentistry.

It is to be hoped that, following the interest manifested by medical men in pyorrheal infections, those interested in research will attack some of the other unsolved mouth problems. Dentists and dental schools are not yet in a position to do much along these lines. The former because present requirements do not provide proper educational qualifications, and the latter have not as yet received such recognition as is manifested in specific endowments.

Let us endeavor to provide the parents with such knowledge as will enable them to render the best service to those in their charge from infancy to maturity, the physician from the period of gestation to adolescence, the teacher during the school period, even in the university, and the dentist during all the time he may come in contact with the mothers and children, in the hope that preventive dentistry will be a future possibility.

In closing let me plead for the abolition of the word "inspection" in medical and dental hygienic procedure. It arouses the curious, antagonizes the self-willed individual, and creates a feeling of opposition because the word "inspection" presumes an interference with one's private affairs.

SOCIETY REPORT

THE CALIFORNIA PEDIATRIC SOCIETY—NORTHERN BRANCH

Held September 25, 1915

WILLIAM B. LEWITT, M.D., PRESIDING

TREATMENT OF PARALYSIS FOLLOWING ACUTE ANTERIOR POLIOMYELITIS

DR. WALTER F. SCHALLER read this paper. (See p. 516.)

DR. ETHAN H. SMITH, presenting a case, said in discussion: I notice the doctor mentions that in many of these cases there is no shortening of the extremity. We have paid too much heed in the past to the spinal cord and to the nervous element in these cases, and not enough to the muscular element. In the beginning of the cases there is distinct and positive myositis which we have overlooked. I have never yet seen a case of severe poliomyelitis in which there was not a sufficient interference with the nutrition of the extremity to cause some shortening of the bone of the paralyzed part. We are too prone to make our measurements from the usual points, the pelvis to the maleolus. We have in many cases a drop heel due to the paralysis of the calf muscles and the plantar fascia is very apt to contract in consequence. If we compare the length of the extremities, one bone with the other, tibia with tibia, I think you will find in all marked cases there is a distinct shortening of the paralyzed side, regardless of any treatment. I make this statement without wishing to criticise anyone.

This little girl was paralyzed at the age of fourteen months. She is now nine and a half years old. All operative measures should be deferred until such time as all possible recuperation from natural sources has ceased. A mistake has been made in trying to operate, doing muscle transplantations before all nature's powers to recuperate have been exhausted. This is true whether we resort to electricity, massage, muscle training, or anything else. This little girl had marked paralysis of the left lower extremity, with the right leg and foot somewhat involved. The right limb has recovered completely. The left hip and thigh are very nearly perfect. She had quite a marked disability of the left leg from knee to ankle. She was treated without massage and electricity. Owing to myositis, which causes muscle softening, massage in the early stages is prone to lead to minute hemorrhages into the muscle. The trouble is not limited to the spinal cord and the nerves leading from the spinal cord. We have acute intestinal lesions also.

I wish to emphasize the distinct myositis that is present in all these cases. Massage will injure the muscles and lead to the formation of scar tissue and much more disability. I was taught to use electricity and I know that in recent years we use it with much more skill than twenty or thirty years ago. I am not as enthusiastic about electricity to-day as I was twenty years ago, and very much less enthusiastic than I was ten years ago. This child was treated without electricity and massage. A little over thirteen months ago I did a simple operation on the left leg. I did not transplant a muscle. I did not take away anything I could not restore, but put in a simple silk ligature. The silk ligature has been seriously abused in many cases. It is an abominable thing if applied with the idea that it is going to carry the weight of the patient. It will not carry weight, but where it can hold the part in an approach to the normal, without sustaining the body weight, a silk ligature will sometimes be of more benefit than muscle transplantation.

Dr. James T. Watkins, presenting a case, said: It happens that the treatment of the patient whom I wish to present is not really germane to Dr. Schaller's paper. On the other hand, she affords a rather striking demonstration of the value of the principle involved in the operative treatment of the deformities following infantile paralysis.

As you will perceive by the photographs taken before the operation, she originally presented a very marked "claw-foot" deformity.

You will observe in the picture which records the maximum plantar flexion that this motion had occurred principally in the midtarsal joint. In the picture which indicates the maximum dorsal flexion you will notice that the foot does not come up to within 15 to 20 degrees of a right angle with the leg, and that the toes are sharply sub-luxated upon the metatarsal heads. When I attempted further to dorsi-flex the foot I found that I encountered the greatest opposition from the muscles which pass forward to the fore foot from behind the malleoli.

My problem then was twofold: First to sufficiently elongate this last group of muscles to permit the foot to come up to or beyond a right angle with the leg, and at the same time to enable the dorsi-flexors to draw up the foot without causing subluxation of the toes.

You will, of course, recall that where we have a "claw foot," so-called, the condition is regularly due to a paralysis of the lumbricals. Ordinarily these muscles by their contraction hold the phalanges firmly upon the metatarsals and in this way oppose a resistance to the upward pull of the dorsal flexors. When both muscle groups are active, the toes remain unchanged in their relation to the foot, while the latter as a whole is drawn upward. However, once the lumbricales are paralyzed, the pull of the dorsiflexors being no longer counterbalanced, their first action is to carry the toes upward to a marked degree of subluxation, and only secondarily to raise the fore foot on the leg.

The indication for operation then was, after elongating the muscles which pass behind the malleoli, to find a new insertion for the dorsi-flexors which would enable them to raise the fore foot without luxating the toes. Therefore I did a subcutaneous division of the tendons of the peroneals behind the ankle and of the flexor longus hallucis and plantar fascia in the sole of the foot. This was accompanied by a vigorous brisement, and the foot was put up in plaster-of-Paris in maximum dorsal flexion. The Achilles tendon was not divided at this time.

Some weeks later, after having again increased the degree of over-correction in plaster-of-Paris, I undertook the second step of the operation. As you see by the scars, I attempted to do this through two longitudinal incisions on dorsum of foot. The tendons were uncovered, divided and their distal ends stitched to the tendons of the extensor brevis. Their proximal ends were attached to the metatarsal bones just behind the metatarso-phalangeal articulations. I did this by boring holes through the bones and passing "Pagenstecher" sutures through them. I then basted the sutures into the severed tendons, using the Lange stitch. The wounds were closed with horsehair and the limb put up in over-correction. In order to avoid a possibility of putting a strain on the newly-attached tendons a subcutaneous Achillotomy was done at the same time.

It is still too soon to call this our final result—you have the several dates of operation there in the history. However, in the light of past experience with a number of these cases, we can safely assure the child's parents of a permanent and gratifying result. You see she has dorsal flexion beyond a right angle, while the toes maintain their normal relation to the rest of the foot.

I think, as far as my reading goes, the opinion of the majority of orthopedists, and they are the persons who principally handle these conditions, is that you do not get very much result from your electricity. Whether the men on this side have had the patience to continue it for a great length of time or not, I do not know. When I was over in Wurzburg with Professor Hoffa, we carried out very much the treatment Dr. Sherman has spoken of, and which I described at great length in a paper some years ago. Dr. Hoffa believed he saw results. I could not persuade myself that I saw the same results. My own feeling has been that where I got feet in proper relation to the legs and the patients were able to get about upon them, not infrequently a good deal of power returned. To be sure, I have not, myself, submitted patients to long courses of electricity. I see that in his book that has lately appeared, Frauenthal speaks in favor of it. On the other hand, Dr. Lovett is, if anything, against it and in favor of the passive and active exercise treatment.

Dr. Harry M. Sherman said: I was attracted here this evening particularly by Dr. Schaller's paper. I have a habit, which is getting somewhat a fixed one, of saying that a great many years ago I did something, and that is true in this instance. When I first came to San Francisco in 1885 and began to take care of children at the Children's Hospital, I had cases of this kind in my care, and I went to work as earnestly as I could with all the means which we then had, and they were practically nothing but the battery and the brace. After having spent a couple of years in treating these children with electricity, and not having gotten anything that I thought was satisfactory reward for my efforts and for the cost of the patients in time and in suffering, for apparently these children succeeded in suffering, I went East and talked the matter all over with Dr. M. Allan Starr, who had been an intimate friend of mine during our student life.

He told me he had had this same experience and had come to the point of stopping the use of electricity. That was in 1889. Since that time I have never used electricity for the treatment of any of these conditions. The lesion is a cord lesion. A degeneration of cells in the cord forms, due to infection with unknown organisms, or to emboli checking the blood supply by plugging terminal cord arteries, resulting in the degeneration and death of the cell, and a dead nerve cell is dead for all time. The scar tissue which finally takes the place of the nerve cells shows there has been a destruction of nerve tissue, and that it has not been replaced by new nerve tissue. Taking that as the pathology, I have never seen the value of electricity applied to the extremities. During the period when I was using electricity, I used to use galvanic up and down the spinal column in hope that some of it might go into the cord and stimulate repair in those nerve cells which were in a debatable stage. That action was based upon a certain case reported by Starr, in which he had succeeded in getting recovery more quickly in the arm muscles of a child who was a subject of diphtheritic paralysis by using electricity. He stimulated one arm and not the other and then changed and stimulated the second arm and not the first. In each instance the arm that was being stimulated recovered the faster. I went to work on the spinal cord because of that case, thinking that perhaps galvanism would stimulate nutritive processes in the cells in the debatable stage. I never got any result that I could see from the treatment.

At the Children's Hospital, when the paralytic children were brought in, we put them into such apparatus as would make it possible for them to stand up, whether they stood up on legs alone or with crutches. Sometimes we deliberately made quadrupeds of them by stiffening some of the knees and giving them a pair of crutches; and children who could not walk at all were finally made to walk with legs and crutches. Normal innervation of the muscles still alive and their use in these positions of functional efficiency resulted in improvement and response to volition—not to electricity. I have seen recovery in muscles which have been long inoperative by putting them in a position in which they could do their work—this without any electricity or any massage.

I might say briefly, in passing, that in Germany I watched the massage treatment of these cases at various hospitals. They brought in a group of children and each one was massaged three or four or five minutes. Then another group was brought in and subjected to similar treatment. It seemed to me a perfectly ridiculous thing to do. Hoffa, of Wurzburg, was at that time (1895) putting on a rubber bandage to exsanguinate the limb, and then using electricity, on the idea that normally electricity would follow the blood-stream, as it was a better conductor than the solid tissues, but if the blood was driven out the current could be made to traverse the nerve-trunks and muscles. I saw children in his establishment who had been there for months, but were not being benefited.

DR. LEONARD W. ELY said: It is always a good idea to get a new viewpoint. We are watching these cases with interest, and while we cannot go quite as far in our enthusiasm as Dr. Schaller does, still, one never knows what will come out of a different line of treatment. It is to be observed that practically all these cases have been provided with braces. As to hypertrophy of nerve cells by electricity, we are very skeptical. A dead nerve cell is a dead nerve cell. We agree absolutely about the medical treatment, except that we go a little further. No medicine can affect in any way a dead nerve cell.

These different methods of treatment, upon which so much stress is laid, probably all have at bottom the same purpose. Our idea in the treatment is practically twofold. The first is to prevent deformity, or to correct it if it is already there, and the second is to get the children on their legs, so that they will use their muscles to get about, and thereby promote the nutrition of their muscles. In other words, by braces we prevent deformity, and we attain whatever use of muscles can be attained. He who massages prevents deformity and keeps the nutrition of the muscles up. He who uses electricity does the same thing. All accomplish the same thing in different ways. It is easy to go too far with braces. We put on just enough brace to prevent deformity and enable the child to get about. We do not splint every paralyzed joint. If the child can use his thighs, even with paralyzed quadriceps, we let him do so. Having prevented deformity and having attained all the nutrition of muscles we can, we procrastinate. We put off operation as long as we can. The temptation is to do elaborate tendon graftings. Once in awhile we find it necessary. We never rush into it. We wait as long as we can. We do not do ankylosing operation on these young children. We do as little operating as we possibly can. It is to be noticed that these cases do not correspond with the description in the text-book, which says that a great deal of improvement may be expected for six months, and that all improvement will take place in a year. This is an error. The improvement will go on for a number of years. If deformity be corrected which has already existed, even if the muscles have been paralyzed for a year or so, improvement will set in. The main thing is not to hurry and not to do too much.

Dr. Watkins demonstrated a case of infantile paralysis in a girl of twelve years.

DR. SCHALLER said: The discussion seems to be generally unfavorable to the electrical treatment of paralysis following acute anterior poliomyelitis. To my way of thinking, however, the facts brought out by a careful analysis of my cases from the standpoint of progress made by them before and after such treatment permits of but one conclusion, *i.e.,* that such treatment is not only to be recommended, but is indicated in every case.

CREOLIN IN SCABIES IN THE INFANT

DR. DOUGLASS W. MONTGOMERY read this paper. (See p. 525.)

THE USE OF "EIWEISSMILCH"

DR. LEO L. MEININGER read this paper. (See p. 529.)

DR. LANGLEY PORTER said: The presentation by Dr. Meininger leaves very little to be said as to the value of eiweissmilch. At Lane Hospital we used it for a good many years. When it was first advanced by Finkelstein we took it up and abandoned it as Dr. Meininger did, but then we discovered that we abandoned it not because of insufficiencies in the medium itself, but because of our own stupidity in not grasping exactly the limitations and advantages of the food. I think that as Dr. Meininger has covered the theory of its value so clearly and the way in which it is to be used, I will deal with the limitations and difficulty of its preparation.

During the last year I made it my business to go into the diet kitchens of many hospitals in the eastern part of the country. I found there a wide divergence of opinion as to the value of eiweissmilch, or albumin milk as it is called, in the United States. The divergence ranged from the Infants' Hospital in Boston, where they ignored it, to the Michael Reese Hospital in Chicago and the Babies' Hospital in New York, where practically every child gets eiweissmilch. No diet kitchen prepared it quite the same way as any other, and many men feeding it seemed to have very little idea of its action as outlined by Dr. John Howland, who uses it in all cases of intoxication and all cases of diarrhea. He uses the formula which is also used in the Babies' Hospital in New York and which is the one we use at Lane Hospital, that is, all of us except Dr. Lyman, who uses the original Finkelstein preparation, which is made by precipitating the curd of a quart of milk, washing it and forcing it through a sieve, adding a pint of buttermilk and a pint of water.

Originally Finkelstein left the sugar out of the formula. After a great many years he changed his opinion and added 2 per cent. dextri-maltose, often 3 per cent., as his babies then did better; it was this formula that we originally used and on it we found that babies lost weight and we early learned to add the sugar. However, we had difficulty in making the preparation. The curd became so tough that it was almost impossible for the nurse to force the curd through a fifty mesh sieve, which was called for in the original formula, and once it was through it separated out into tough masses. We also found that we had to be careful of the acidity of the buttermilk; anything more than ½ per cent. was damaging, not only to the preparation of the food, but it made the baby vomit. We learned that leaving the curd in contact with the lab ferment too long also made the curd tough, and, further, we learned that washing with cold water, unless the curd was manipulated a great deal, would make it grow tough. These points made the preparation so difficult that we abandoned it for a time.

While I was at the Babies' Hospital in New York I was so struck with the apparent value of the food that I talked to the dietician there, who also said that they had experienced these difficulties and now avoided them by leaving the milk to curdle with the ferment only twenty minutes instead of an hour; they did as little manipulation as possible and moistened the curd with the buttermilk instead of with the water and it went through the mesh much more readily, because it was not toughened. Within the last four months I have been using this formula, with great advantage, without sugar for twenty-four hours, 1½ per cent. added sugar the second twenty-four hours and 2½ per cent. the third twenty-four hours.

Recently a child came to Lane Hospital who had been voiding at least six stools, sometimes ten and twelve, a day with many of them containing more than ¼ pint of fluid with acidity higher than the acid of the gastric juice. On the second day of eiweissmilch the stools were reduced to four, still loose, but the child was improving. Then, remembering that the virtue of the milk lies in the production of soapy stools and finding the stools not soapy enough, we added 1 per cent. fat in the form of cream. The next day the stools were two in number, large and soapy.

The real value of the preparation is not only in its action on the intestines, but one of the great advantages lies in the fact that the curd is separated very evenly and presents a great deal more surface area to the digestive juices of the stomach than does the untreated milk. In the second place, the salts in the milk, while not particularly lower in the eiweissmilch than in the cow's milk, are probably present in a more available form; for the action of the food depends on the fact that fat in the presence of protein and calcium salts allows soapy stools to form, diminishes peristalsis and checks the outflow from the body of the mineral bases and thus prevents a secondary acidosis in the presence of digestive disturbances.

DR. ALFRED E. MEYERS said: There are one or two points which I would like to add. Dr. Porter has shown that there is an increased tolerance for carbohydrates, especially when given in connection with high proteid. It frequently happens that children fail to gain when the sugar content is up to 5 per cent. When such is the case one should try raising the percentage of sugar to 7 per cent. and even to 10 per cent., always watching the stools for signs of intolerance.

A second point I would like to make. In the chemical examination of stools Meyer has shown that one-half the total fat found in the stools of acute intestinal cases is in the form of fatty acid with very little soap; while Keller, on the other hand, has shown that soaps predominate in chronic intestinal conditions, and with but very little free fatty acid. Holt has shown that in normal cases 12.4 per cent. of the intake of fat appears in the stools; in loose stools 23.1 per cent. of the intake appears, and in very loose stools 40.5 per cent. of the intake appears. The point I want to make is that in most cases of diarrhea there is a great deal of fat in the stools, and in diagnosing a case from the examination of the stool, there is a possibility of concluding that the condition is primarily due to too much fat, while it may be due to too high sugar. The fatty diarrhea usually responds easily to treatment, whereas one due to too high sugar may go on to infantilism.

DR. GEORGE D. LYMAN said: There is another method of preparing eiweissmilch, which is in use in the von Pirquet Clinic in Vienna and is known as soluble eiweissmilch.

The curd, prepared from 2 quarts of milk, is mixed with a 5 per cent. soda solution (sodium carbonate) until the reaction with litmus paper is amphoteric or minimal alkaline. Water is then added up to one liter and allowed to boil, during which the curd goes into the solution. There is then no more trouble in getting the curd through the nipple.

STUDY OF THE PROBLEM OF DENTAL HYGIENE IN CHILDREN

DR. GUY S. MILLBERRY read this paper. (See p. 533.)

DR. T. C. MCCLEAVE said: We have heard so much of late years about the relationship of infections of the mouth cavity to general diseases that the medical profession, particularly the pediatrics section, is well informed about the subject and quite alive to the importance of it. But to anyone working in the clinics, who sees a large number of children of the class that goes to the clinics, the universality of caries is appalling, and it seems to me it is not a problem of medicine at all, but of dentistry. How are we going to get the necessary service given to these children? Practically every child who comes into the clinic is in need of many hours of dentistry. It has been said by the reader of the paper that sufficient time cannot be given to the cases. Personally I cannot see what we are going to do about it. Some routine system must be devised for the care of these children. The beneficial effect of removal of tonsils and adenoids is to a large degree nullified by the tremendous infection of the teeth of these children. I think no more pressing problem is before us, and at the same time no more hopeless problem for solution in the immediate future.

Dr. Langley Porter said: One of the most important points Dr. Millberry brought out is in relation to orthodontia. I think that any of us who have sent children to be operated on for the removal of adenoids and tonsils and found the operations without the full results we anticipated, have been forced to come to the conclusion that the trouble lay not only in the tonsil and adenoid condition, but even more in the narrowing of the jaw. I had hoped that Dr. McCleave would touch upon that point.

I think in asking Dr. Millberry to close one can say that the problem of the dental attention to children in San Francisco lies in our breeding a Forsyth in the community where we live. The Forsyth Clinic in Boston is doing the kind of work we must do here.

I would like to ask Dr. Millberry whether the theory of the mucous plaque and the acid cleansing for the mouth is on an established basis or not?

Dr. H. H. Yerington said: I was interested especially in what Dr. Millberry said about carbohydrate feeding in relation to these cases. Recently in looking over six or seven hundred intestinal cases in children I found the majority living on a high carbohydrate feeding. I think this is the case in the feeding of most children at the present time. In this series over 65 per cent. were suffering from dental caries, many of them to a marked degree. Few of us realize what a marked effect certain foods have on dental caries and the great number of children suffering from it.

Dr. E. C. Fleischner said: There are numerous phases of the subject that present themselves for consideration. In the first place, it is exceedingly important to the medical man, and equally important to the dentist. Dr. Millberry very ably presents the subject to a group of men, most of whom are sufficiently interested to inspect the mouths of all patients with whom they come in contact. The dentists are likewise interested in the subject and also very careful of the mouths of all children with whom they come in contact. We have, unfortunately, to take into consideration a poor class of men in each profession: In the first place, the careless doctor, and, in the second place, the ignorant dentist. There is practically never a week that passes by that most men who are caring for children have not this experience. A child is brought in who is suffering from malnutrition, with a severe degree of caries present. The first question is, "Have you taken the child to the dentist?" The answer is, "Yes, but he said it was too bad to fill, and might just as well be left in, because if it was pulled out that would interfere with the development of the permanent teeth." A very important point at the present time is to educate the professional men in both directions. Many men look into the mouth at the tonsil and pay no attention to the teeth whatever. If you look over the history of many of our clinics you will find careful notation of tonsils and adenoids, and practically nothing concerning the condition of the teeth. Naturally it is important that the public be educated, but it is equally important that dentists and doctors be educated. In most of our practice we find many more teeth properly cared for than ten years ago. There is no question that children are more frequently taken to the dentist for examination than formerly. The dentist has another rôle. He may feel that he will be criticised by some people, but I cannot see why he cannot say to the parents whom he treats, "Why do you not bring me the children? Why may I not examine the teeth of the children, as I examine yours?" Of course, everyone who does much work among children realizes the importance of this thing. I believe it would be well within the province of this Society to appoint a joint committee with the Dental Society to see what means or measures might be adopted whereby more careful preservation could be made of the teeth of the children who come to the clinics.

In closing I would like to ask Dr. Millberry if he would be good enough to tell what his experience has been since the regular observation of the school children has been in effect, as to the number of children referred to the dentists from the schools. It is the common experience of the medical man to have children referred to him with bad tonsils and adenoids and eyes from the medical men and nurses doing school work. I would like to know how many children are sent back to the parents with instructions to take them to the dentist.

Dr. A. M. Flynn said: I do not know that I can add anything to what has been said this evening. In the Children's Hospital, where we have many tonsil operations, I may say that about 70 per cent. of the cases have very carious teeth. The first molars are usually entirely gone, only the roots being left, while the incisors and bicuspids are badly decayed.

The parents of these children neglect the teeth; or else the dentists neglect them, as in some instances the parents report that they have consulted a dentist and he has told them that the teeth are too bad to treat.

A question which is now to be considered most seriously is this, viz., What effect have such teeth upon the tonsils? Or is it the other way round—Are the infected tonsils responsible for the bad teeth?

In most of the above cases, while we had hypertrophied tonsils, the crypts were filled with cheesy material as well. Could there be a connection between the pathologic process in the crypts and the carious condition in the teeth?

Dr. Adelaide Brown said: I do not think mothers understand at all how very important the six-year-old molars are. They are teeth sacrificed exceedingly often by dentists. The child suffers a good deal, is difficult to manage and the aching tooth is pulled out without the parents being told that it is a permanent tooth and its value explained to them.

The time between twelve and twenty-four months of age is the time to teach the child thorough mastication. Many children are kept on liquid diet and allowed to have the bottle until two years of age. They handle it very dirtily. It is thrown all over the crib and the floor, and the child gets a good deal of mouth infection in that way. If the child takes the bottle, it will not take solids and chew them. It always has seemed to me that the way to keep teeth clean was to chew the food thoroughly well. Probably by this friction as much cleansing is done as by the use of the brush.

Dr. L. L. Meininger said: I do not know that I have any solution to offer. Dr. Fleischner spoke of the fact that if the child was taken to the dentist he usually did not repair the teeth, but frequently told the parents to wait until the second teeth appeared. This has likewise been my experience. The solution of the problem of caring for the teeth, I presume, is up to the proper attitude of the dental profession.

Dr. Gurley said: An ideal is something away in the distance which we cannot reach, but which we work to as an ultimate goal. Truth is an ideal. Dr. Fleischner little realizes how nearly he told the truth when he said there were two classes in the medical and dental professions. Therefore in bringing the matter before the Pediatric Society, where we have representatives of the medical profession interested, representatives of the dental profession interested, combined with social workers interested in the welfare of the child, possibly through a combined committee, we might appeal to the Board of Supervisors for help in this sort of thing.

The local Dental Society has two dental clinics in the city. We have had one for several years at the Associated Charities, but now the equipment is used by the Polyclinic, where it is necessary for them to charge a fee—small as compared with professional fees, but nevertheless a fee. The other clinic is established in the Telegraph Hill Neighborhood Association. The Dental Society owns the outfits in both these institutions. At the Telegraph Hill they do the work free, or a charge of five or ten cents is made. Miss Ashe told me they took in $8.50 and paid the dentist $20 a month.

Dr. Brown has spoken of the "six-year" molar. And I will answer Dr. Fleischner by saying that I am one dentist who does ask the mother about the children. As soon as the child has one tooth I tell her to bring it down, and to continue to bring it, first to clean the teeth and second to educate the mother as to what the teeth are, when the deciduous teeth will be replaced and whatever else there is for her to know. The "six-year" molar is the most important tooth we have. We can do a great deal of preventive dentistry, and there is no better way than by getting hold of the child and taking care of the teeth before they have been attacked by caries.

The need of keeping the child's mouth clean is extremely apparent. Dr. F. A. Keyes, dentist to St. Vincent's Orphan Asylum in Boston, published a table of infectious diseases in 1908. In 1909 a dental clinic was established with reduction of infectious diseases yearly, until in 1914-1915 there was but 1 case of infectious disease.

I believe that through the influence of the Pediatric Society we might appeal to the Board of Supervisors for the establishment of dental clinics to take care of these children of the poorer classes, to give them the attention so very badly needed, and if those of you in the medical profession will force it down the throats of the less interested members of your profession, those of us in the dental profession will do likewise.

Dr. Millberry, closing the discussion, said it had proven exceedingly interesting. Many of the questions he might not be able to answer.

Dr. McCleave asks: "How can we arrive at a solution of the problem?" From a reparative standpoint, it is impossible under present conditions. From the standpoint of the natural care of the teeth, there is a possibility, and that is the manner in which diet is prescribed for children. Pediatricians are in touch with children during the entire period of childhood. They are in a position to recommend solid, hard foods and fruits when not contraindicated, and such other articles of diet as will act as a salivary excitant and to advise against the use of pasty foods—sweets, especially between meals, which are responsible by fermentation for the acids, which at least in part are responsible for tooth disintegration. If they need dental attention they should be recommended to the dentist. We do not see them unless they are suffering. At three or four years of age the child begins to suffer from decayed teeth. The mother's mouth must be looked into during the period of gestation. That is a period we never have anything to do with, unless the mother happens to come during pregnancy. The decayed teeth remain in position alongside of the permanent teeth and cause the permanent teeth to decay and, as a result, caries in the permanent teeth develops nearly as fast as they are erupted. I am quite in accord with Dr. Fleischner's statement. We are doing all we can to have the men look upon the problem in a different light. The trouble is that the dentists, who are desirous of making money, feel that the work with children does not pay. Many parents feel that the child ought to have dentistry at half price. They get railroad fares and hotel rates at half price. They do not realize that the materials cost just as much; that the teeth are as large as the adult's; that more time is required; and that it is far more troublesome to care for children. When that realization is brought home to parents, you will get more co-operation on the part of the dentist.

Dr. Fleischner asks whether the public school nurses examine the mouths of the children and report to the parents and the Board of Health as they do with regard to other diseases. As far as I know, they do not. It would benefit the children if this could be made a part of their work, and then the children be followed up to determine whether their recommendations were adopted.

Answering with regard to mucous plaques, the late Dr. G. V.

Black, one of the best authorities in dentistry in the world, is the one who advocated the theory of mucous plaques. This adhesive mucous substance in the mouth is precipitated around the teeth. The lips and tongue do not reach it and remove it, and the only possible way of removing it is by dissolution or mechanical cleansing. Mucin is precipitated by alcohol and weak organic acids, as you all know, but is soluble in weak alkaline solutions. Therefore, if the saliva can be rendered alkaline by natural methods the mucous plaques will be less likely to form. If we can keep the saliva in normal condition it is to be preferred, and it is believed that acid diet seems to produce alkaline saliva. We are all conscious of the psychic factor in the flow of saliva and the influence food has in stimulating the flow.

The six-year molar that Dr. Brown mentions is one of the most important and most difficult problems we have to contend with. Ninety-five per cent. of the mothers believe it to be a first tooth. They seldom present a case to us until decay has progressed and the pulp canals are infected, and it is practically impossible to fill the tooth with any assurance of success. It either must come out, or, if filled, may possibly cause an alveolar abscess.

Dr. Ashe asks: "What are we going to do for poor children? Do you realize that the city provides treatment for every form of human ailment except the care of the teeth? They can go to any hospital and receive treatment for everything except the care of the teeth." That is the thing we have been trying to impress upon the Supervisors for many years. At the present time the Mothers' Congress is working on the problem, and they need the co-operation of everybody interested. Miss Musto has arranged a meeting with the Board of Education and others to discuss this problem.

The equipment which the San Francisco Dental Society secured four years ago is available for the establishment of a clinic for poor children. We are hoping that if we cannot do any better we can get one of the outfits placed in the San Francisco City and County Hospital, but it has been found more satisfactory to have the clinics established in the public schools for two reasons—first, because the children can receive attention without forfeiting their attendance, an important thing when we consider the apportionment of the state school funds, which is based upon attendance; and, second, the children are more amenable to treatment in the schools at the request of the teacher than when required to leave home or school to visit a dental office or public clinic. My idea is that the city ought to provide a minimum salary of $100 a month for men who will give full time, under the direction of the Board of Health or the Board of Education. I think this will give satisfactory results. If this organization could lend its endorsement either by resolution or letter to the Mayor or the people interested, I think it would help very materially. We are not interested in the adults. It is the children we want to take care of. We would like to prevent the troubles the children are falling heir to. I should like to urge upon your organization some action in this regard.

The University of California does all it can. Unfortunately, we are not endowed as yet. We hope to be, and some of the members of our faculty are working upon the problem of the establishment of just such institutions as the Forsyth. Mr. Eastman, of the Eastman Kodak Company, has made it possible to establish a new clinic in Rochester, New York, which will cost in the neighborhood of $200,000 when complete. The city of Rochester will contribute $20,000 a year for five years, private subscriptions $10,000 a year for five years, and he will provide $30,000 for five years. If at the end of this time it proves a good thing he will endow it with $750,000. There are lots of people looking for such an opportunity, and we hope to utilize those forces for the children's sake and not our own.

Dr. McCleave asked me to speak on the problem of the children being referred back to the medical man with the report that the teeth are too bad to fill. This is due to the ignorance and indifference of that type of dentist who does not care about children's work, and I regret that so many practicing dentists are indifferent to this problem. Such teeth can be taken care of in a very brief space of time. Fifteen or twenty minutes will usually serve to repair each tooth and prevent further caries of deciduous teeth with little trouble on the part of the dentist.

A motion was made, seconded and carried, that the secretary write to the Board of Supervisors, endorsing the application for funds for a dental clinic.

DEPARTMENT OF ABSTRACTS

Original Condensations of Current Pediatric Literature
by the Editors and the Following Associates

Charles E. Farr	New York City
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Edwin T. Wyman	Boston, Mass.
J. Herbert Young	Newton, Mass.

Fischer, Louis: The Value of Transfusion in Atrophic and Devitalized Infants and Children. (Medical Record, February 5, 1916, p. 223.)

The classes of infants adapted to the transfusion therapy are: infants of the marasmic or atrophic type, in whom gastroenteric disturbances preclude successful feeding; the toxic and septic type of acute infectious diseases, and the hemorrhagic type of disease. The method of transfusion consists in withdrawing from the donor, with the aid of a blunt-pointed steel needle and a record syringe, as many ounces of blood as desired. Coagulation may be prevented by a solution of citrate of soda, kept at blood heat until needed. The donor is recumbent, with a tourniquet above the elbow. A 30 c.c. record syringe with a needle one and one-half inches long inserted into the median cephalic vein is used. The barrel of the syringe is detached and the blood emptied into a large beaker containing 2½ c.c. of a 10 per cent. solution of sodium citrate. The needle is left *in situ* and kept free by the insertion of a 1 per cent. solution of sodium citrate with a small record syringe. The Unger apparatus for direct transfusion has some advantage. In the infant there are four places adapted for this method: (1) The median cephalic vein, (2) the median bacillic, (3) the jugular, and (4) the longitudinal sinus. The sinus is entered through the anterior fontanel. In about 2 per cent. of the cases the red cells of the donor or the recipient will be hemolized or agglutinated by the serum of the other. If time permits this should be tested. Another danger is dilatation of the heart. When the heart is embarrassed the transfusion should be interrupted every few minutes. In fever there is a decided drop of temperature following transfusion. While transfusion never cures pernicious anemia, it leads to remissions in about half of the cases. The advantages of the syringe method are: the lack of pain, of traumatism, of shock, and that the donor's blood can be removed, mixed with an anticoagulant, and sent to the patient. The latter is important if the patient has an acute infectious disease. C. E. F.

LA FÉTRA, L. E.: HEREDITARY SYPHILIS IN CHILDREN: LATER MANIFESTATIONS AFTER THE AGE OF ONE YEAR. (New York State Journal of Medicine, March, 1916, p. 125.)

The author remarks that manifestations which appear about the time of second dentition correspond usually with those of tertiary stage of adult life, while the symptoms of congenital syphilis with early manifestation are similar to secondary stage, as seen in adults. He assumes that the shortness of stature may be intimately connected with involvement of the ductless glands. He lays special emphasis on the probability that syphilitic taint predisposes to early rickets, and describes one of the eye changes as a steamy or ground-glass appearance of the cornea. He divides the deafness into two types—the one nonspecific, caused by the specific enlargement of the lymphoid tissue of the nasopharynx, and the other the classical deafness due to central origin. He divides Hutchinson's teeth into three varieties and describes them as peg-shaped, screwdriver type, and a third form in which the cutting edge is narrow but the sides convex. He believes these above-mentioned varieties occur only in syphilis. He cites a case of his own in which a hoarse voice was the only symptom. The blood was 16 units positive and the voice became normal after the administration of neosalvarsan.

The author cites a case of chronic bronchopneumonia which had other specific lesions and which had a strongly positive Wassermann. He urges the necessity of the Wassermann reaction in nephritis of children where the origin is unexplained. He dilates on the frequency of bony changes, speaks of spontaneous fractures of syphilitic origin, and remarks that specific arthritis with involvement of one joint or many is quite common. He believes that bilateral enlargement of the epitrochlear glands, where there has been no lesion of the hands or forearms, is always pathognomonic.

Examination of the records at Bellevue for a two and one-half year period showed 148 cases of syphilis; 3 were acquired types, 85 were hereditary under one year, 60 were hereditary over one year. In the author's series the commonest signs in the younger children were the eruption, rhagades and condylomata; in the older children, bony changes and affections of the central nervous system. Hutchinson's teeth were infrequent and not one case exhibited the Hutchinson triad. He believes the Wassermann test can be relied upon absolutely.

The author devotes considerable space to syphilis of the central nervous system, mentions the frequency of this condition, and states it is much more prevalent than supposed and that a Wassermann should be done in all cases. S. M.

CHERRY, THOMAS H., AND LANGROCK, EDWIN G.: THE RELATION OF HEMOLYSIS IN THE TRANSFUSION OF BABIES WITH THE MOTHERS AS DONORS. (Journal of the American Medical Association, February 26, 1916, p. 626.)

Hemorrhagic disease of the newborn is one of the most fatal and frequent of ailments of the infant. In this disease the average proportion of occurrence is 1 in every 1,000 births. The statistics vary somewhat. Townsend found in the Boston Lying-in Hospital that it occurred in 32 infants out of every 5,000 births. At Prague, the proportion was 190 to 13,000, and at the New York Foundling Hospital Epstein found it in 8 per cent. of the infants.

The authors divide this disease clinically into two classes: (1) The first consists of those cases in which hemorrhage may occur from the musoca of the gastrointestinal tract, the stump of the cord and subcutaneously. Diagnosis is assured from the frank appearance of the blood. (2) The second class is formed by those cases in which bleeding occurs in some internal organ. Early diagnosis is difficult and often the patient is almost exsanguinated. In this class transfusion is best adapted and most clearly indicated. The subcutaneous injection of animal or human serum or of whole human blood seems to supply the necessary elements to cause clotting of the blood. Transfusions not only supply the elements that promote clotting, but increase the cellular elements which assist the functional ability. To prove that the mother would be the best donor for her infant the authors tested the agglutination and hemolytic reaction on a series of 34 mothers and infants. The results were all uniform; no hemolysis nor agglutination occurred. The advantage of the mother being the donor is that she is constantly and readily accessible, that all delays are avoided, and that expense is diminished. It was found by the authors that 60 or 75 c.c. of blood was sufficient to supply the infant with the necessary elements to promote clotting and replace those elements lost by hemorrhage. C. E. F.

STONE, ARTHUR K.: SUBNORMAL TEMPERATURE IN TUBERCULOSIS. (Medical Press and Circular, February 9, 1916, p. 126.)

The author has noted this condition particularly in the stage directly following the acute fever. During this period, which may last for weeks, the patients are rapidly improving. He regards this subnormal curve as favorable. He quotes Rundle, of England, who noted the beneficial effect of tuberculin during the subnormal period. In the records of the Good Samaritan Hospital for 378 cases of tuberculosis, he found that 58 had had a subnormal temperature for two to four week periods and a few for several months. In a camp connected with the same institution, primarily for early cases, a review of the first 100 cases, 41 had had periods of subnormal temperature.

To quote the author: "All told, I have come to consider this persistent subnormal temperature so constant an accompaniment of tuberculosis becoming quiescent that it may be considered of diagnostic importance." S. M.

AYNESWORTH, K. H.: ACUTE APPENDICITIS IN CHILDREN. (American Journal of Obstetrics, 1915, p. 893.)

Acute appendicitis in children is not so rare as has been thought. From the author's statistics more than 18 per cent. of the operations for acute appendicitis have been in children. It may occur so early as the fifth week. The writer has rarely seen a case in a child and never in an infant before pus formation or a spreading peritonitis. There are two main pitfalls in diagnosis—that the child is subject to frequent attacks of mild abdominal affections, accompanied by fever, pain, nausea and vomiting, and that children do not localize painful areas unless the peritoneum is involved.

The characteristics of anatomic development in a child, such as a shorter mesentery, longer appendix, unrotated cecum and co-incidence of the abdominal and the pelvic cavities, tend to obscure the usual adult manifestations of the attack. With pain, vomiting, tenderness, rigidity in any part of the abdomen and fever the diagnosis of appendicitis can be made with much certainty. Rectal examination, especially if bladder symptoms are present, is very necessary in all cases of suspected appendicitis, when the usual signs of peritoneal irritation are not present. As the acute abdominal pain in pneumonia and pleurisy often simulates appendicitis, the referred pain from the dorsal nerves in these conditions must be kept in mind. After diagnosis has been made, and the operation refused, opiates should be given to relieve the pain.

The author states that the cardinal principles of abdominal surgery in children are: a short operation, a small amount of handling of tissues and drainage when infection is present.

C. E. F.

WOOLLEY, PAUL G.: FETAL ERYTHROBLASTOSIS. (The Journal of Laboratory and Clinical Medicine, February, 1916, pp. 347-354.)

The author comments on the increasing interest in congenital general edema. He quotes Chiari, who was able to find but 70 cases in the literature between 1614 and 1898. Recently, reports are more frequent. He groups causes as follows: (1) Hydrops ascites congenitus, due to disturbed portal circulation; fetal peritonitis, absence of the ductus venosus arantii and certain anomalies of the intestinal tract. (2) Anomalies of the circulatory system. (3) Nephritis of the mother. (4) Some metabolic disturbance of the fetus, resulting in abnormal blood production and edema. (5) Lastly, fetal erythroblastosis. This last-mentioned condition is characterized by universal edema of the fetus, placenta and cord, with very large spleen and liver.

The author's case was one of twins; the other child was apparently normal. He quotes Schreddes' belief that the condition is the result of severe fetal anemia. It is assumed the disease has a toxic origin. The toxic materials cause destruction of the erythrocytes and stimulate the blood-forming organs. The anasarca is due to disturbed production and increased destruction of the red blood cells. The author points to analogy between this condition and leukemia. If, then, this is a neoplastic overgrowth the erythroblastic tissue is involved. S. M.

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EDITORIAL

THE PRESENT EPIDEMIC OF INFANTILE PARALYSIS

The ARCHIVES OF PEDIATRICS takes great pleasure in reporting in full for this number the meeting on Infantile Paralysis held at the New York Academy of Medicine on July 13th. Other special articles on the subject complete what we consider is the most comprehensive report on the subject to date. There had been far too much hysteria on the subject of this disease, and the meeting held, at what we hope is the height of the present epidemic, did much to educate and to reassure the lay and the medical mind. While comparatively little was suggested in regard to the etiology and treatment of poliomyelitis, yet the hope of an ultimate cure was always held before the eyes, and, what was of vast importance, the prevention and prophylaxis was emphasized to the Nth degree.

ORIGINAL COMMUNICATIONS

THE NATURE, MANNER OF CONVEYANCE AND MEANS OF PREVENTION OF INFANTILE PARALYSIS *

BY SIMON FLEXNER, M.D.

Director of Laboratories of The Rockefeller Institute for Medical Research, New York

The Rockefeller Institute for Medical Research has been appealed to by so many physicians and laymen for information and advice on the subject of infantile paralysis, that it has seemed desirable to relate the facts of present knowledge concerning certain highly pertinent aspects of the disease, together with deductions of practical importance derived from them.

Nature—Infantile paralysis is an infectious and communicable disease which is caused by the invasion of the central nervous organs—the spinal cord and brain—of a minute, filterable microörganism which has now been secured in artificial culture and as such is distinctly visible under the higher powers of the microscope.

Location of the Microörganism or Virus in the Sick—The virus of infantile paralysis, as the microörganism causing it is termed, exists constantly in the central nervous organs and upon the mucous membrane of the nose and throat and of the intestines in persons suffering from the disease; it occurs less frequently in the other internal organs, and it has not been detected in the general circulating blood of patients.

Location of the Virus in Healthy Persons—Although the microörganism of infantile paralysis is now known, the difficulties attending its artificial cultivation and identification under the microscope are such as to make futile the employment of ordinary bacteriologic tests for its detection. Nevertheless, the virus can be detected by inoculation tests upon monkeys, which animals develop a disease corresponding to infantile paralysis in human beings. In this manner the fact has been determined that the mucous membrane of the nose and throat of healthy persons who have been in intimate contact with acute cases of infantile paralysis may become contaminated with the virus, and that such contaminated persons, without falling ill themselves, may convey the infection to other persons, chiefly children, who develop the disease.

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* Read at a Special Meeting on Infantile Paralysis held at the New York Academy of Medicine, July 13, 1916, and also reported in the Jour. of the A. M. A.

Relation of Virus to Types of the Disease—The virus has, apparently, an identical distribution irrespective of the types or severity of cases of infantile paralysis. Whether the cases correspond with the so-called abortive forms of the disease in which definite paralysis of the muscles does not occur at all, or is so slight and fleeting as often to escape detection; whether they correspond with the meningeal forms in which the symptoms resemble those of acute meningitis with which muscular paralysis may or may not be associated; or whether they consist of the familiar paralytic condition, the virus is present not only within the nervous organs, but also upon the mucous membranes of the nose, throat and intestines.

Escape of the Virus from the Body—Microörganisms which convey disease escape from the body of an infected individual in a manner enabling them to enter and multiply within fresh or uninfected individuals in such a manner as to cause further disease. The virus of infantile paralysis is known to leave the infected human body in the secretions of the nose, throat and intestines. It also escapes from contaminated healthy persons in the secretions of the nose and throat. Whether it ever leaves the infected body in other ways is unknown. At one time certain experiments seemed to show that biting insects, and particularly the stable fly, might withdraw the virus from the blood of infected persons and inoculate it into the blood of healthy persons. But as the virus has never been detected in the blood of human beings and later experiments with the stable fly have not confirmed the earlier ones, this means of escape of the virus must be considered doubtful. On the other hand, it has been shown by experiments on animals, so that the same facts should be regarded as applicable to human beings, that the virus seeks to escape from the body by way of the nose and throat, not only when inoculation takes place through these membranes, but also when the inoculation is experimentally made into the abdominal cavity, the blood, or the brain itself. From this it is concluded that the usual means of escape of the virus is by way of the ordinary secretions of the nose and throat, and, after swallowing these, with the discharges of the intestines.

Entrance of the Virus into the Body—The virus enters the body, as a rule if not exclusively, by way of the mucous membrane of the nose and throat. Having gained entrance to those easily accessible parts of the body, multiplication of the virus occurs there, after which it penetrates to the brain and spinal cord by way of the lymphatic channels which connect the upper nasal membrane with the interior of the skull. Whether the virus ever enters the body in any other way is unknown. Certain experiments already alluded to make it possible that it may be inoculated into the blood by insects, and other experiments have shown that under peculiar and extraordinary conditions it may in monkeys enter through the intestines. But while the latter two modes of infection may operate sometimes, observations upon human cases of infantile paralysis and upon animals all indicate that the main avenue of entrance of the virus into the body is by way of the upper respiratory mucous membrane—that is, the membrane of the nose and throat.

Resistance of the Virus—The physical properties of the virus of infantile paralysis adapt it well for conveyance to the nose and throat. Being contained in their secretions, it is readily distributed by coughing, sneezing, kissing, and by means of fingers and articles contaminated with these secretions, as well as with the intestinal discharges. Moreover, as the virus is thrown off from the body mingled with the secretions, it withstands for a long time even the highest summer temperatures, complete drying, and even the action of weak chemicals, such as glycerin and carbolic acid, which destroy ordinary bacteria. Hence mere drying of the secretions is no protection; on the contrary, as the dried secretions may be converted into dust, which is breathed into the nose and throat, they become a potential source of infection. The survival of the virus in the secretions is favored by weak daylight and darkness, and hindered by bright daylight and sunshine. It is readily destroyed by exposure to sunlight.

Conveyance by Insects—Since epidemics of infantile paralysis always arise during the period of warm or summer weather, they have been thought of as possibly being connected with or dependent on insect life. The blood-sucking insects have especially come under suspicion. Experiments have been made with biting flies, bed-bugs, mosquitoes, and with lice. Neither mosquitoes nor lice seem able to take the virus from the blood of infected monkeys or to retain it for a time in a living state. In one instance, bed-bugs have been made to take up the virus from the blood of monkeys, but they did not convey it by biting to healthy monkeys. Certain experiments did indicate that the biting stable fly could both withdraw the virus from the blood of infected and reconvey it to the blood of healthy monkeys, which became paralyzed. But more recent studies have failed to confirm the earlier ones. Moreover, experimentally inoculated monkeys differ in one way from human beings suffering from infantile paralysis, for while the virus may appear in the blood of the former, it has never been detected in the blood of the latter. The ordinary or domestic fly may become contaminated with the virus contained in the secretions of the body and serve as the agent of its transportation to persons and to food with which they come into contact. Domestic flies experimentally contaminated with the virus remain infective for forty-eight hours or longer. While our present knowledge excludes insects from being active agents in the dissemination of infantile paralysis, they nevertheless fall under suspicion as being potential mechanical carriers of the virus of that disease.

Conveyance by Domestic Animals—The attention which the recent epidemic of infantile paralysis has drawn to the diseases attended by paralysis has led to the discovery that domestic animals and pets are subject to paralytic diseases. The animals which have especially come under suspicion as possibly distributing the germ of infantile paralysis are poultry, pigs, dogs and cats. But in isolated instances, sheep, cattle and even horses have been suspected. All these kinds of animals are subject to diseases in which paralysis of the legs and other parts of the body sometimes appears. In not a few instances, paralytic diseases among poultry or pigs have been noted to coincide with the appearance of cases of infantile paralysis on a farm or in a community. Experimental studies have, however, excluded the above-mentioned animals from being carriers of the virus of infantile paralysis. The paralytic diseases which they suffer have long been known and are quite different from infantile paralysis. Their occurrence may be coincidental; in no instance investigated has one been found to be responsible for the other.

Routes of Travel—Studies carried out in various countries in which infantile paralysis has been epidemic all indicate that, in extending from place to place or point to point, the route taken is that of ordinary travel. This is equally true whether the route is by water or land, along a simple highway or the line of a railroad. In other words, the evidence derived from this class of studies confirms the evidence obtained from other sources in connecting the distributing agency intimately with human beings and their activities.

Survival of the Virus in the Infected Body—The virus of infantile paralysis is destroyed in the interior of the body more quickly and completely than, in some instances, in the mucous membrane of the nose and throat. It has been found in monkeys, in which accurate experiments can be carried out, that the virus may disappear from the brain and spinal cord within a few days to three weeks after the appearance of the paralysis, while at the same time it is still present upon the mucous membranes mentioned. The longest period after inoculation in which the virus has been detected in the mucous membrane of the nose and throat of monkeys is six months. It is far more difficult to detect the human than the monkey carriers of the virus, since, as directly obtained from human beings, the virus displays a low degree of infectivity for monkeys; while once adapted to monkeys, the virus becomes incredibly active, so that minute quantities are capable of ready detection by inoculation tests. Yet in an undoubted instance of the human disease, the virus was detected in the mucous membrane of the throat five months after its acute onset. Hence we possess conclusive evidence of the occurrence of occasional chronic human carriers of the virus of infantile paralysis.

Fluctuation in Epidemics—Not all epidemics of infantile paralysis are equally severe. Indeed, great variations or fluctuations are known to occur not only in the number of cases, but also in the death rate. The extremes are represented by the occasional instances of infantile paralysis known in every considerable community and from which no extension takes place, and the instances in which in a few days or weeks the number of cases rises by leaps and bounds into the hundreds, and the death rate reaches 20 per cent. or more of those attacked. While all the factors which determine this discrepancy are not known, certain of them have become apparent. A factor of high importance is the infective power or potency, or technically stated the virulence, of the microörganism or virus causing the disease. This virus is subject to fluctuations of intensity which can best be illustrated by an example. The virus as ordinarily present in human beings, even during severe epidemics, has low infective power for monkeys. But by passing it from monkey to monkey, it tends to acquire after a variable number of such passages an incredible activity. However, occasional samples of the human virus refuse to be thus intensified. But once rendered highly potent, the virus may be passed from monkey to monkey through a long but not indefinite series. Finally, in some samples of the virus, at least, a reverse change takes place—the virus begins to lose its virulence until it returns to the original, or even to a diminished degree, of infective power. In this respect the behavior of the virus corresponds to the onset, rise and then the fall in number and severity of cases as observed in the course of epidemics of infantile paralysis and other epidemic diseases. Hence either a new active specimen of the virus may be introduced from without which, after a certain number of passages from person to person, acquires a high potency; or a specimen of virus already present and left over from a previous epidemic after a resting period and similar passages, again becomes active and reaches an infective power which equals or even exceeds that originally possessed. Another but more indefinite factor relates to the degree of susceptibility among children and others affected which at one period may be greater or less than at another.

Varying Individual Susceptibilities—Not all children and relatively few adults are susceptible to infantile paralysis. Young children are more susceptible generally speaking than older ones; but no age can be said to be absolutely insusceptible. When several children exist in a family or in a group, one or more may be affected, while the others escape or seem to escape. The closer the family or other groups are studied by physicians, the more numerous it now appears are the number of cases among them. This means that the term infantile paralysis is a misnomer, since the disease arises without causing any paralysis whatever, or such slight and fleeting paralysis as to be difficult of detection. The light or abortive cases, as they are called, indicate a greater general susceptibility than has always been recognized; and their discovery promises to have far-reaching consequences in respect to the means employed to limit the spread or eradicate foci of the disease.

Period of Incubation—Like all other infectious diseases, infantile paralysis does not arise at once after exposure, but only after an intervening lapse of time called the period of incubation. This period is subject to wide limits of fluctuation: in certain instances it has been as short as two days, in others it has been two weeks or possibly even longer. But the usual period does not exceed about eight days.

Period of Infectivity—Probably the period at which the danger of communication is greatest is during the very early and acute stage of the disease. This statement must be made tentatively, since it depends on inference, based on general knowledge of infection, rather than on demonstration. Judging from experiments on animals, the virus tends not to persist in the body longer than four or five weeks, except in those exceptional instances in which chronic carriage is developed. Hence cases of infantile paralysis which have been kept under supervision for a period of six weeks from the onset of the symptoms may be regarded as practically free of danger.

Protection by Previous Attack—Infantile paralysis is one of the infectious diseases in which insusceptibility is conferred by one attack. The evidence derived from experiments on monkeys is conclusive in showing that an infection which ends in recovery gives protection from a subsequent inoculation. Observations upon human beings have brought out the same fact, which appears to be generally true, and to include all the forms of infantile paralysis, namely, the paralytic, meningeal, or abortive, which all confer immunity.

Basis of the Immunity—The blood of normal persons and monkeys is not capable of destroying or neutralizing the effect of the virus of infantile paralysis. The blood of persons or monkeys who have recovered from the disease is capable of destroying or neutralizing the effect of the virus. The insusceptibility or immunity to subsequent infection, whether occurring in human beings after exposure or monkeys after inoculation, rests on the presence of the destroying substances, the so-called immunity bodies, which arise in the internal organs and are yielded to the blood. So long as these immunity bodies persist in the body, protection is afforded; and their presence has been detected twenty years or even longer after recovery from infantile paralysis. Experiments have shown that the immunity bodies appear in the blood in the course of even the mildest attack of the disease, which fact explains why protection is afforded irrespective of the severity of the case.

Active Immunization—Protection has been afforded monkeys against inoculation with effective quantities of the virus of infantile paralysis by previously subjecting them to inoculation with sub-effective quantities or doses of the virus. By this means and without any evident illness or effect of the protective inoculation, complete immunity has been achieved. But the method is not perfect, since in certain instances not only was immunity not obtained, but unexpected paralysis intervened. In the instances in which protection was accomplished, the immunity bodies appeared in the blood.

Passive Protection—By transferring the blood of immune monkeys to normal or untreated ones, they can be rendered insusceptible or immune, and the immunity will endure for a relatively short period during which the passively transferred immunity bodies persist. The accomplishment of passive immunization is somewhat uncertain, and its brief duration renders it useless for purposes of protective immunization.

Serum Treatment—On the other hand, a measure of success has been achieved in the experimental serum treatment of inoculated monkeys. For this purpose blood serum derived either from recovered and protected monkeys or human beings has been employed. The serum is injected into the membranes about the spinal cord, and the virus is inoculated into the brain. The injection of serum must be repeated several times in order to be effective. Use of this method has been made in a few instances in France where the blood serum derived from persons who had recovered from infantile paralysis has been injected into the spinal membranes of persons who have just become paralyzed. The results are said to be promising. Unfortunately, the quantity of the human immune serum is very limited, and no other animals than monkeys seem capable of yielding an immune serum and the monkey is not a practicable animal from which to obtain supplies.

Drug Treatment—The virus of infantile paralysis attacks and attaches itself to the central nervous organs. Hence it is reached not only with difficulty, because nature has carefully protected those sensitive organs from injurious materials which may gain access to the blood, but it must be counteracted by substances and in a manner that will not themselves injure those sensitive parts. The ideal means to accomplish this purpose is through the employment of an immune serum, since serums are among the least injurious therapeutic agents. The only drug which has shown any useful degree of activity is hexamethylenamin, which is itself germicidal, and has the merit of entering the membranes, as well as the substance of the spinal cord and brain, in which the virus is deposited. But experiments on monkeys have shown this chemical to be effective only very early in the course of the inoculation and only in a part of the animals treated. Efforts to modify and improve this drug by chemical means have up to the present been only partially successful. The experiments have not yet reached the point where the new drugs are applicable to the treatment of human cases of infantile paralysis.

Practical Deductions and Applications—(1) The chief mode of demonstrated conveyance of the virus is through the agency of human beings. Whether still other modes of dissemination exist is unknown. According to our present knowledge, the virus leaves the body in the secretions of the nose and throat and in the discharges from the intestines. The conveyers of the virus include persons ill of infantile paralysis in any of its several forms and irrespective of whether they are paralyzed or not, and such healthy persons who may have become contaminated by attendance on or association with the ill. How numerous the latter class may be is unknown. But all attendants on or associates of the sick are suspects. These healthy carriers rarely themselves fall ill of the disease; they may, however, be the source of infection in others. On the other hand, the fact that infantile paralysis is very rarely communicated in general hospitals to other persons, whether doctors, nurses, or patients, indicates that its spread is subject to ready control under restricted and supervised sanitary conditions.

(2) The chief means by which the secretions of the nose and throat are disseminated is through the act of kissing, coughing or sneezing. Hence during the prevalence of an epidemic of in-

fantile paralysis, care should be exercised to restrict the distribution as far as possible through these common means. Habits of self-denial, care, and cleanliness and consideration for the public welfare can be made to go very far in limiting the dangers from these sources.

Moreover, since the disease attacks by preference young children and infants, in whom the secretions from the nose and mouth are wiped away by mother or nurse, the fingers of these persons readily become contaminated. Through attentions on other children or the preparation of food which may be contaminated, the virus may thus be conveyed from the sick to the healthy. The conditions which obtain in a household in which a mother waits on the sick child and attends the other children are directly contrasted with those existing in a well-ordered hospital—the one is a menace, the other a protection to the community. Moreover, in homes the practice of carrying small children about and comforting them is the rule, through which not only the hands, but other parts of the body and the clothing of parents may become contaminated.

(3) Flies also often collect about the nose and mouth of patients ill of infantile paralysis and feed on the secretions, and they even gain access to the discharges from the intestines in homes unprotected by screens. This fact relates to the domestic fly, which, becoming grossly contaminated with the virus, may deposit it on the nose and mouth of healthy persons, or upon food or eating utensils. To what extent the biting stable fly is to be incriminated as a carrier of infection is doubtful; but we already know enough to wish to exclude from the sick, and hence from menacing the well, all objectionable household insects.

Food exposed to sale may become contaminated by flies or from fingers which have been in contact with secretions containing the virus; hence food should not be exposed in shops and no person in attendance upon a case of infantile paralysis should be permitted to handle food for sale to the general public.

(4) Protection to the public can be best secured through the discovery and isolation of those ill of the disease, and the sanitary control of those persons who have associated with the sick and whose business calls them away from home. Both these conditions can be secured without too great interference with the comforts and the rights of individuals.

In the first place, where homes are not suited to the care of the ill, so that other children in the same or adjacent families are exposed, the parent should consent to removal to hospital in the interest of the sick child itself, as well as in the interest of other children. But this removal or care must include not only the frankly paralyzed cases, but also the other forms of the disease. In the event of doubtful diagnosis, the aid of the laboratory is to be sought, since even in the mildest cases changes will be detected in the cerebrospinal fluid removed by lumbar puncture. If the effort is to be made to control the disease by isolation and segregation of the ill, then these means must be made as inclusive as possible. It is obvious that in certain homes isolation can be carried out as effectively as in hospitals.

But what has been said of the small incidence of cases of the disease among the hospital personnel and those with whom they come into contact, indicates the extent to which personal care of the body by adults and responsible people can diminish the menace which those accidentally or unavoidably in contact with the ill are to the community. Care exercised not to scatter the secretions of the nose and throat by spitting, coughing and sneezing, the free use of clean handkerchiefs, cleanliness in habits affecting especially the hands and face, changes of clothes, etc., should all serve to diminish this danger.

In the end, the early detection and isolation of the cases of infantile paralysis in all of its forms, with the attendant control of the households from which they come, will have to be relied upon as the chief measure of staying the progress of the epidemic.

(5) The degree of susceptibility of children and other members of the community to infantile paralysis is relatively small and is definitely lower than to such communicable diseases as measles, scarlet fever and diphtheria. This fact in itself constitutes a measure of control; and while it does not justify the abatement of any practicable means which may be employed to limit and suppress the epidemic, it should tend to prevent a state of over-anxiety and panic from taking hold of the community.

(6) A percentage of persons, children particularly, die during the acute stage of the disease. This percentage varies from 5 in certain severe epidemics to 20 in others. The average death rate of many epidemics has been below 10 per cent. A reported high death rate may not be actual, but only apparent, since

in every instance the death will be recorded, while many cases which recover may not be reported at all to the authorities. In the present instance it is too early in the course of the epidemic to calculate the death rate, which may prove to be considerably lower than it now seems to be.

(7) Of those who survive, a part make complete recoveries, in which no crippling whatever remains. This number is greater than is usually supposed, because it includes not only the relatively large number of slight or abortive cases, but also a considerable number of cases in which more or less of paralysis was present at one time. The disappearance of the paralysis may be rapid or gradual—may be complete in a few days or may require several weeks or months.

The remainder, and, unfortunately, not a small number, suffer some degree of permanent crippling. But even in this class the extent to which recovery from the paralysis may occur is very great. In many instances the residue of paralysis may be so small as not seriously to hamper the life activities of the individual; in others in whom it is greater it may be relieved or minimized by suitable orthopedic treatment. But what it is imperative to keep in mind is that the recovery of paralyzed parts and the restoration of lost muscular power and function is a process which extends over a long period of time—that is, over months, and even years. So that even a severely paralyzed child, who has made little recovery of function by the time the acute stage of the disease is over, may go on gaining for weeks, months, and even years, until in the end he has regained a large part of his losses. Fortunately, only a very small number of the attacked are left severely and helplessly crippled. Lamentable as it is that even one should be so affected, it is, nevertheless, a reassurance to know that so many recover altogether and so much of what appears to be permanent paralysis disappears in time.

There exists at present no safe method of preventive inoculation or vaccination, and no practicable method of specific treatment. The prevention of the disease must be accomplished through general sanitary means; recovery from the disease is a spontaneous process, which can be greatly assisted by proper medical and surgical care. Infantile paralysis is an infectious disease, due to a definite and specific microörganism or virus; recovery is accomplished by a process of immunization which takes place during the acute period of the disease. The tendency of the disease is toward recovery and it is chiefly, or only because the paralysis in some instances involves those portions of the brain and spinal cord which control respiration or breathing and the heart's action, that death results.

Finally, it should be added that not since 1907, at which time the great epidemic of infantile paralysis, or poliomyelitis, appeared in this country, has the country or this state or city been free of the disease. Each summer since has seen some degree of accession in the number of the cases; the rapid rise in the number of cases this year probably exceeds that of any previous year. But it must be remembered that in 1908 several thousand cases occurred in the greater city—possibly, indeed, many cases of and deaths due to the disease were never reported as such. Hence the present experience, severe and serious as it is, is not something new; the disease has been severely epidemic before and was brought under control. The knowledge regarding it now is far greater than it was in 1908; and the forces of the city which are dealing with the epidemic are probably better organized and in more general co-operation than ever before. The outlook, therefore, should not be regarded as discouraging.

BRONCHOTETANY—E. Wieland (Monats. f. Kinderhk., Bd. XIII., Nr. 5, 1914) describes bronchotetany as a spasm of the bronchial muscles, causing dyspnea. It is often fatal. At autopsy, in spite of a diagnosis of pneumonia, there is found no lesion of the epithelia of the lungs, or of the heart, either macroscopic or microscopic. There may be present no other symptoms of spasmophilia. Out of 58 cases of spasmophilia Lederer found 6 of bronchial spasm. All 6 were fatal. There is found dullness localized over areas of atelectasis. A Roentgenogram of the lungs shows no dark area, as in pneumonia, but a diffuse, lighter shadow of atelectasis. Differential diagnosis is made by the X-ray picture only. Therefore we find that bronchotetany shows a sharp clinical and anatomical symptom-complex. The prognosis is bad. The Roentgenogram combined with the symptoms and general spasmophilic state of the child assist in the differential diagnosis. Light forms of pneumonia show almost identical symptoms; but their prognosis is much better.—*The American Journal of Obstetrics.*

ACUTE POLIOMYELITIS *

The Clinical Types of the Disease

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Poliomyelitis is primarily an epidemic disease, and as a sporadic condition has attracted very little notice. The sporadic cases, which, from a study of the epidemiology, always precede by months the epidemic outbreak, do not differ clinically from the epidemic type of the disease. All the epidemics which have thus far been recorded resemble each other very closely. An attempt to connect this disease with the occurrence of cases of cerebrospinal meningitis has broken down to give place to the feeling that poliomyelitis is an entity, clinically occurring in epidemics in the late spring to late autumn, and following the regular sporadic occurrence of the disease in limited numbers in the months following the winter, and reaching into the late spring, up to the time of the epidemic outbreaks. Epidemics of this disease have been noted to skip a year and to always crop up in the place of its original occurrence. This should give the thoughtful a hint as to its possible cause and epidemiology. In all the epidemics thus far recorded the symptomatology and clinical types have been much the same. The fullness of our knowledge of the clinical types of the affection is due to the relative keenness of observation of those who have studied the various epidemics, though we owe most of our scientific knowledge as to the clinical types of poliomyelitis to the Swedish and Norwegian observers, Medin and Wickman. The first inkling of the epidemic nature of the disease was voiced by Colmer, an American physician, who in 1841, having observed some form of paralysis in a child, obtained the history that in the locality in which the patient lived several similar cases had occurred, and most of them had recovered. Following him Caverly, in 1894, described an epidemic in Vermont. Taylor and Chapin later on observed the epidemic nature of the disease. Aside from these observers we owe much of our clinical knowledge of the disease to Medin, who described the clinical types of acute epidemic poliomyelitis in 1884, before the International Congress, much to the astonishment of most pediatrists, who still retained the simple picture as portrayed in older textbooks of poliomyelitis anterior, as a simple infantile paralysis.

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* Read at a Special Meeting on Infantile Paralysis, held at the New York Academy of Medicine, July 13, 1916.

Medin described two epidemics in Stockholm, and Wickman, his pupil, in 1899, in a most painstaking monographic work, established upon a purely clinical basis what we to-day can verify fully as the clinical types of the disease. In all, forty-two epidemics have been observed in America and the Continent, and this alone would establish the tendency of poliomyelitis to occur in epidemic form at certain seasons, to subside and remain sporadic until the time arrived for a new outbreak of the affection.

Occurrence—In all its outbreaks, both in the epidemic and sporadic occurrence, the disease has proven to be one which selects the young as its victims. The epidemic in New York in 1907 showed that of 886 classified cases fully 571 were below three years of age. It may affect the infant at the breast, and, in the above number, 3 were under six months of age. In the present epidemic the youngest I have met was four and one-half months of age, absolutely breast-fed. In the 1907 epidemic 77 cases were under one year of age, and of the above number from three to five years of age there were 200 cases. Thus of the 886 cases 771 occurred below five years of age. There were scattering cases among adults, but not enough to cause any hesitation as to the conclusion of the most susceptible period of life, which seemed to be from one to three years of age. In the present epidemic these figures are apt to be duplicated. Of the 1907 epidemic cases only 2 per cent. occurred between the age of ten to fifteen years.

The Clinical Types of the Disease—The old conception of poliomyelitis as an infantile paralysis, which without prodromata, or very few outside of a temporary disturbance of the stomach, was followed by an overnight paralysis of one or more extremities, has been lost sight of in the more thorough modern clinical analysis of the symptomatology of the disease. We can now describe fully and prove by laboratory aids the following types:

(1) The abortive, probably from a scientific epidemiological standpoint the most important type of the disease.

(2) The bulbo-spinal type of the disease.

(3) The cerebral and meningeal types.

(4) The bulbo-pontine type.

Wickman goes still further, describing the neuritic type of the disease, but of this more later.

All these types may be easily understood if we first conceive poliomyelitis to be an acute infectious disease, in which the infection may involve certain parts of the general nervous structures, causing certain definitely marked pictures and there stop, or may go on to involve, in one stroke, the whole cerebrospinal axis, and in this way cause a debacle of the whole substratum of the nervous economy. To the extent to which the infection goes, to this extent do we obtain a symptomatology. If looked at in this way, as we must, the old descriptions of Charcot, which described a poliomyelitis as an involvement of the ganglion cells of the anterior horns of grey matter of the spinal cord, must to-day be looked on as a small fractional portion of the story.

The Abortive Type—We owe to the keen clinical insight of Wickman the recognition of the abortive types of the disease. It is through these cases that the disease is spread to others and the recognition of such a type of disease is therefore extremely necessary in order to control the spread of the affection. The abortive type of the disease is that clinical type of infection which does not go into paralysis, and with recovery leaves the host uninjured as to the muscular motor apparatus. In the present epidemic this type can be recognized so as to leave no doubt as to its distinct identity. A child of five years of age is attacked with headache, slight malaise, and an attack of vomiting for five days. She complains of intense pains in both lower extremities, radiating to the soles of the feet, the pains are especially marked at night, the child cries out with the pains, so that remedies must be applied, such as heat, locally. On examination there is slight pain in the nape of the neck, the child prefers to lay down and when she walks the gait is cerebellar. There are increased reflexes in the lower extremities, and the child complains of a tired feeling, and looks pale and weary. Under constant observation the temperature rarely mounts above 100½° in the rectum. In ten days the pains have disappeared, the child is well and wants to go out and play. This is a case from the present epidemic, a form, I am certain, that is rarely recognized as poliomyelitis. In other words, here is a child who had all the threatening prodromata of an attack, and still did not develop poliomyelitic paralysis. It is such cases which we must recognize as a marked infection, and treat as such. Another case may illustrate the abortive form with gastric symptoms. A child twenty-one months of age, coming from the epidemic district, is attacked with incessant vomiting after having been taken away from the infected area. This vomiting persists for forty-eight hours without diarrhea; there is also slight pain in the nape of the neck and diminished reflexes, and what is most disquieting sopor and a mild Macewen. In non-epidemic times, it is true, we would hardly think this a form of poliomyelitis, but when a child hails from an epidemic region these symptoms, in the absence of diarrhea, must be looked on with caution. This particular case recovered, but was carefully isolated. The abortive cases, therefore, present prodromata, such as headache, weakness, diminished or increased reflexes, and pain in the nape of the neck, with or without vomiting and fever, and still do not present paralyses and recover. Wickman estimates the abortive cases at 35 to 56 per cent. of the whole number and Müller at 50 per cent., so that in closing this type, it is one to be carefully looked for. In an epidemic fever, headache, vomiting, slight rigidity of the neck, increased or diminished reflexes at the knee must be carefully observed for further developments. Aside from an epidemic few would give such symptoms other than a place among the extremely indefinite signs of an affection.

The Spinal or Bulbo-Spinal Type—This is the most common and simple type, and gives the disease its name. A patient has an attack of vomiting and slight fever and the next morning the mother observes the child cannot move one or other extremity. It is then seen the child is paralyzed. These forms may even have no fever. It has always, however, been a question in my mind as to how accurate the mother has been in her observation, and I still think that in these apparently simple overnight cases there may have been, if carefully looked for, some prodromata, such as fever, malaise, indisposition, peevishness, which may have preceded by a few days the onset of the *paralysis*. In other cases the paralysis appears gradually. The patient has fever, vomiting and headache, is peevish and irritable. This may continue with severe pains in the lower extremities or pains in the back of the neck and muscles of the upper and lower extremities, the fever may subside gradually and then after two or three days it is noticed that one extremity is paralyzed or one may lay flaccid and the other may be partially paralyzed. The pains may continue quite severe and especially when the extremities are moved the paralysis may spread and involve not only the remaining lower extremity, but also the upper extremities, muscles of the back and respiratory muscles of the thorax, so that, as in a baby I saw recently four and one-half months of age, and exclusively breast-fed, the muscles of the abdomen become prominent with each descent of the diaphragm, the patient lies absolutely flaccid both as to all four extremities, muscles of the back and thorax. There is a muscular respiratory paralysis. It is well here to pause and consider what is the limit to the spread of the disease. As a rule, in the purely spinal cases the paralysis appears and does not spread to any extent in the great number of cases. In others it may spread from the extremities and involve the whole trunk, even to causing bulbar paralysis of the respiratory centers. As a rule we may say that after the tenth day a paralysis is not apt to spread to the bulbar medulla, though cases have been known to die after the fifteenth day.

The Meningitic and Cerebral Type—Both these clinical types should be combined, because of the cerebral symptoms which give rise to a picture closely simulating meningitis. This form has lead to a discussion as to whether the spastic hemiplegia of Strumpel should be known as the cerebral or encephalitic type of poliomyelitis, and thus be accorded a separate place in classification. Granted that the spastic form of hemiplegia is a rare type and that it occurs rarely in epidemics, it may be assumed safely that it is a type, and should be grouped with the meningitic form of poliomyelitis, thus simplifying our classification. The meningitic form of poliomyelitis runs its course with cerebral symptoms due to a real injection of the meninges of the brain and cord, thus at first we are at a loss as to whether we are in the face of a meningitis or a meningeal form of poliomyelitis with cerebral symptoms. The clinical picture is very much as follows: A boy three years of age is taken with vomiting, headache, high fever; the fever continues, as also incessant vomiting for forty-eight hours; and then it is noticed that there is rigidity of the neck with pain on flexion of the head, Brudzinski sign and reflex, Kernig, sopor and Macewen, which may be slight or marked, the reflexes at the knee are diminished. Some patients may improve after a day or two, the fever may abate, they may even be about, then they have a recrudescence of fever, sopor, rigidity; they may be delirious, irrational and resent interference; there is extreme hyperesthesia, and pain in the nape of the neck. In some cases an ocular palsy may be the only palsy present, in other cases a slight facial palsy may be present; this may be combined with a weakness in one or other extremity, sometimes the upper extremity. After a week the patient becomes brighter, there is still, however, marked ataxia if the patient is caused to stand with Romberg's symptom, a convalescence is established, the ataxia is the last symptom to disappear. The hydrocephalus and abnormal mental state may remain for some time after the temperature is normal. On recovery there is a slight strabismus, ataxia, optic neuritis. In one group of cases I have seen unilateral ophthalmoplegia with hemorrhages into the retina. The latter is quite a characteristic find in the meningitic form of poliomyelitis. At the onset it is almost impossible to differentiate these cases from cerebrospinal meningitis, and in one of my cases the patient presented the basal pareses, such as facial paralysis, hydrocephalus, stupor, low temperature, without paralysis of the extremities, as seen in tuberculous meningitis, except that the onset was acute instead of slow, as in the tuberculous cases. I have described these meningitic forms of poliomyelitis in a former publication and will not dilate on them here, more than to say that in lumbar puncture lies the differentiation of this form of poliomyelitis from cerebrospinal meningitis.

The bulbar or pontine type of the disease is another form which has only been recognized lately, both in the Swedish and New York epidemics, and deserves notice as a distinct form of poliomyelitis. The following is an interesting case taken from the present epidemic: An infant, breast-fed, thirteen months of age, was attacked with fever and vomiting, and the next morning the fever was continued into the afternoon, when the mother noticed a flatness of the right side of the face. The temperature continued at 102½°; the infant was bright and played in the crib, even laughed, but there was a tired look about the face and eyes, the knee reflexes were increased, otherwise there was no paralysis that could be demonstrated elsewhere. In another case, ten days before I saw the patient, aged twenty-one months, in this epidemic, he was taken with high fever and vomiting; there were green movements. The fever continued, but to a less degree, when on the ninth day of the disease the mother noticed that the right side of the face was flat, there were tremulous movements of the head and arms, and the patient was restless and not quiet for any length of time, constant jactitation of the head, at night the child scarcely slept. There was rigidity of the neck, but no palsies of the upper and lower extremities; on the contrary, the patient exhibited great strength in both. In other cases, the outcome is not so favorable; there is an involvement of the nuclei which control deglutition and respiration and the patients may be lost by paralysis of the respiratory centers.

There have been other types of poliomyelitis described by Wickman, such as the neuritic type. This includes those cases in which pains in the extremities, which are present in the spinal and even meningitic types of the disease, become a leading feature of the clinical picture. Most observers have met these cases in all epidemics thus far described, and in the New York epidemic of 1907 they were among the first cases of the disease to be observed. Many of these cases did not develop paralyses, others did. I have referred to them under the heading of the abortive cases.

"The Diagnosis"—During an epidemic the question of diagnosis must center about the discovery of the early symptoms or prodromata. Experimentally, we know from Flexner that the disease has an incubation of eight to nine days, or even thirty-three days. During this time a prodromal period occurs of one to seven days. A patient who during an epidemic is taken with vomiting and fever, which is continuous, remitting, slightly with headache, malaise, irritability, crankiness as the parents called it, and then has a tendency to sopor, if added to this there is rigidity, Macewen, Brudzinski reflex, we should be on the lookout, especially if added to these there are shooting pains in the extremities, with hyperesthesia. The weakness of the limbs, the increase or diminution of reflex are valuable. These symptoms justify a lumbar puncture in order to establish the character of the fluid, which, in most cases, shows a lymphocytic cytology, and an increase of globulin. The examination of the blood is very uncertain, as in the very early stages there may be a lymphocytic leukopenia and in the later stages a polynuclear leukocytosis.

The Prognosis—Of 143 fatal cases Wickman found death to occur within ten days; 65 died within four or five days from the onset of the disease. Thus if a patient survives the tenth day of his affection the prognosis as to life is favorable. The mortality in past epidemics must necessarily have varied. It may be said that the low mortality of 10 per cent. applies to children below eleven years of age, and a higher mortality, as much as 27 per cent., among older children and adults. Fully 20 per cent. (Wickman) of all cases make a complete recovery. Here also the younger the child, the better the prognosis. Fully 48 per cent. of the children from the ninth to the eleventh year recover.

Treatment—It is very difficult to formulate the treatment in a disease in which the etiology is obscure and the mode of transmission is a mooted point. We can do a great deal, however, for the comfort of the patient, and from our scientific knowledge of the pathology of the disease, probably much to control its advance. In mild cases of the abortive type the patients should be immediately isolated, kept perfectly quiet, and watched. A lumbar puncture is not only desirable, but it should be explained to the parents that it is for the benefit of the patient. In the cerebral cases lumbar puncture certainly is a relief for the restlessness. It reduces the amount of intracranial pressure, and it also withdraws from the general cerebrospinal system a certain amount of toxin laden fluid. I therefore advise strongly that it should be made in every case. The cerebral cases, especially of the meningitic type, are relieved by lumbar puncture. These children should be absolutely quiet, not only should the room be quiet as to noises, but the body should have absolute rest. In the German clinic of Munich, it has been strongly advised that where it is possible, and there is not too much jactitation, the early cerebral cases and meningeal cases, even before the onset of paralysis, when only weakness of the limbs is present, should be put in a Bradford frame in order to secure quiet and rest for the cerebrospinal axis. As far as the paralyzed cases are concerned, if there is a muscle contracture or drop foot, even where there is some pain, it relieves the pain, and in a certain number of cases corrects the deformity, if the extremities are put up early in plaster or glass. On the other hand, a number of cases are not improved in this way, and when the apparatus is taken off the deformity returns. Later on division of tendons may be necessary to correct contractures. If children complain a good deal of pain in the extremities, this may be relieved very much with warm baths. It is wise, however, to give only one bath in twenty-four hours, and in doing so we must lift the patient very carefully in and out of the bath. We must never lose sight of the fact that rest, as well as quiet and ventilation, should be the keynote of our treatment, because there is a very active process going on in the brain and spinal cord, and anything which tends to produce too much motion in the coverings or their parts not only aggravates the symptoms, such as pain, but may do irreparable mischief. We therefore should not be too anxious to allow the children to sit up or get out of bed.

The subsequent deformity is really an orthopedic field. As to medicinal treatment, our knowledge is partly experimental, but for the most part empirical. We have been told by the research laboratory that urotropin can be split up in the body, and a few moments after its ingestion can be found, as to its elements, in the subdural space (Cushing). Acting on this suggestion, the use of urotropin, in the very early stages of the disease, and in the abortive cases also, is prevalent. I cannot truly say that we have to-day any positive evidence of its utility in checking the disease. We should give it, however, to the patient with the feeling that it may do some good. For the pains, which are sometimes very severe, aspirin and salol may be used, or perhaps small doses, exceedingly small, of pyramidon, the latter most cautiously. Opium is only given in cases where the bromides and chloral do not relieve the restlessness of the patient. Opium is not to be given where there is a tendency to sopor. Empirically we can say that iodide of potassium in full doses relieves the neuritic pains much more successfully than any drug thus far mentioned. In some cases the relief is almost instant. This, also, however, may be simply coincidence. After the acute stage is passed over, and there is weakness and paralysis of the extremities, the patient should be given the benefit of the Charcot injections of strychnia. These children bear strychnia very well. A child of five years of age should be given one injection of 1/40 to 1/50 grain once a day in the group of weakened or paralyzed muscles, selecting a different set of muscles each day. I have been repeatedly asked what is the rationale of these injections, but I have been unable to say. In some cases where they are given recovery seems to be remarkably complete from the paralysis, and yet it must not be forgotten that this recovery occurs in a certain number of cases without injections. In spite of this fact, however, in the present state of our knowledge, we should not deny to these children the benefit of these injections.

In closing I wish to emphasize what I have said concerning quiet and rest. These children must not be hustled into experiments with nostrums and modes of treatment which do not spare and conserve the nervous forces. All treatment should be guided by what we know of the pathology of the disease.

30 East Sixty-second Street.

THE IMPORTANCE OF THE PRESENT EPIDEMIC OF POLIOMYELITIS * †

BY HAVEN EMERSON, M.D.

Commissioner of Health, New York

The importance of the present epidemic lies in the fact that it is the first time that a consistent campaign of publicity and education has been undertaken during the progress of the epidemic for the sake of establishing sanitary control of all cases during the period of infectivity. Compulsory notification, isolation in hospital or sanitary homes, placarding of homes and quarantine of exposed children of the family for two weeks and of the patient for eight weeks, have been enforced for the first time in this city.

We are not able as yet to present in complete form the history of this epidemic. Our records to date show the date of report of the cases, not the date of onset of the disease in each case. In a house-to-house canvass of the infected district in Brooklyn many unreported cases have been discovered and, although we have a record of but 5 reported cases of poliomyelitis in May, we now know of 26 more which had their onset during May. In June, also, many cases running into the hundreds had their onset and yet were not reported by physicians or discovered by search made by department field agents until July. In June the increase in cases reported was not marked until the end of the first week and not until June 20th was there a noticeable or alarming increase. Until July 11th the increase was very rapid. Since then there has been an irregular but gradual decline in the incidence of the disease in Brooklyn and no very large increase in any other borough. A study of the death rates for the city as a whole, of diphtheria, scarlet fever, measles and diarrheal disease during the last three years and the first six months of this year show that the number of cases of poliomyelitis and the mortality during this epidemic, as well as during the period covered by these statistics, has been small by comparison.

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* Read at a Special Meeting on Infantile Paralysis, held at the New York Academy of Medicine, July 13, 1916.

† Special stenographic report corrected by the author for ARCHIVES OF PEDIATRICS.

DEATHS OF CHILDREN UNDER FIVE YEARS OF AGE

City of New York (all boroughs)

	Order	1913	1914	1915	6 months 1916
Diarrheal Diseases	1	3,718	3,579	3,924	884
Diphtheria	2	972	1,143	967	556
Measles	3	596	534	593	369
Whooping-cough	4	415	273	385	213
Scarlet Fever	5	307	285	174	47
Acute Poliomyelitis	6	33	24	10	57

During the first six months of 1916 there were 884 deaths from diarrheal disease and 57 from poliomyelitis. The community looks with complacency on the former, while it is panic stricken over the latter. The interest at the present time is in the psychological state of the lay public. The reason for this is probably because this is the first epidemic of poliomyelitis in this city in which the disease has been made reportable and also the first in which there has been an effort at hospitalization. We acknowledge that our present method of attempting to control the disease is frankly an experiment. At the onset of the outbreak the Health Department was confronted with two alternatives. The one was secrecy; that is, whether we should simply see what could be done by the medical control of cases without publicity. The other alternative was publicity, which offered a better prospect of a real control of the disease. We decided in favor of publicity and hospitalization. As a result there has been an undue fright on the part of the public, probably due to our unusual method of approaching the problem. Reporting cases was new, placarding houses was new, and hospitalization was new. In 1907 it was not until November that the epidemic that was then drawing to a close was studied. In November of 1907 the Pediatric Section of the Academy and the New York Neurological Society appointed a committee to make a study of the disease, but they were not active at the time the cases were acute. In that epidemic there were probably 2,500 cases, of which 700 cases were accurately studied, and the mortality among these was 27 per cent. The average mortality as estimated in foreign epidemics has been from 7 to 10 per cent. During the present epidemic (corrected to July 23d) 2,824 true cases have been reported or discovered and there have been 579 deaths, or a case fatality of 20.5 per cent. It is estimated that the case fatality of the 1907 epidemic was 5 per cent. Forty per cent. of the cases reported to the department are found on careful study, with the aid of spinal puncture and ward observation, in many instances to be "no case." In other words, both the profession and the laity are at present so alert to the necessity of reporting any doubtful case of sickness in a child that the Department of Health is justified in considering that it receives all but a very small percentage of true cases of the disease now occurring in this city. The most important factors in dealing with the disease are early diagnosis, isolation and putting all cases under early orthopedic and neurologic observation. This method may save the individual and the public from the future burden that permanent crippling implies. The early recognition of the condition is the most important factor in preventing the spread of the virus among the healthy.

Poliomyelitis is essentially a disease of childhood. At least 99 per cent. of the children affected in this epidemic have been born since the last epidemic. Out of 1,584 cases in Manhattan and Brooklyn, 1,303, or 82 per cent., were under five years of age, and 1,540, or 97 per cent., under ten years of age. Out of 588, 454 have shown paralysis in some form, but not always for more than a very brief period.

Apparently the nativity of the mother has had little effect upon the mortality, as can be seen from the following table:

MORTALITY FROM ACUTE ANTERIOR POLIOMYELITIS IN CHILDREN UNDER FIVE YEARS OF AGE—JUNE 1–JULY 15 ,1916

	No. of deaths	Rate per 1,000 children under five years, of given nativity
Austria-Hungary	16	1.
Germany	14	3.5
Italy	78	2.
Russia	50	2.
Ireland	16	2.
Scotland	3	5.
Sweden	7	7.
Other foreign	19	2.
United States of America	97	2.
Total studied	300	

In about 50 per cent. of the cases the paralysis made its appearance in the course of a few days after the onset of the disease. The longest period after the onset at which paralysis has made its appearance was sixteen days. In between 5 and 8 per cent. of the cases there are secondary or subsequent cases in the same family that may be traced to the primary case. When we get a second or third case in the course of three or four days it is safe to classify it as a secondary case. These facts are important, since the public was not previously impressed by the infectious nature of the disease. In regard to transmission, we can only suspect a person of being a carrier, since we are unable to prove it, as we can in diphtheria and typhoid fever carriers. Thus it has been a question whether one has a right to interfere with a supposed carrier. It is to be hoped that this epidemic will clear up some of these doubtful questions.

This epidemic has also been the first opportunity we have taken to make use of concerted action on the part of the hospitals. This will result in a plan for co-operation in the future and will favor scientific advance in the study of the disease. I would like to indicate that our experience has shown us the necessity of a hospital having a staff suited to meet the needs of these patients. Such a staff should include a laboratory diagnostician, a neurologist, an orthopedist and a pediatrician. I would urge hospitals likely to have these cases to organize a staff of this type for dealing with this epidemic. We can also make use of social service organizations to a greater extent than in other conditions. There is need of concentrated home follow-up of all patients. This will be a great need for years after they have left the hospital. Among the hospitals in the city that are receiving cases of poliomyelitis are the following:

Private Hospitals:

St. Vincent's Hospital	Richmond
Long Island College Hospital	Brooklyn
New York Throat, Nose and Lung	Manhattan
Lincoln Hospital	The Bronx
Babies' Hospital	Manhattan
Lebanon Hospital	The Bronx
Methodist Episcopal Hospital	Brooklyn
Presbyterian Hospital	Manhattan
St. Francis' Hospital	The Bronx

Private Hospitals—Continued

St. Vincent's Hospital	Manhattan
Mt. Sinai Hospital	Manhattan
St. Peter's Hospital	Brooklyn
Neurological Hospital	Manhattan
The Saint Mary Hospital	Brooklyn
Norwegian Hospital	Brooklyn
St. John's Hospital	Queens
St. Catherine's Hospital	Brooklyn
New York Orthopedic Hospital	Manhattan

Department of Health Hospitals

Willard Parker Hospital	Manhattan
Kingston Avenue Hospital	Brooklyn
Riverside Hospital	The Bronx
Queensboro Hospital	Queens

Other City Hospitals:

Greenpoint Hospital	Brooklyn
City Hospital	Manhattan
Kings County Hospital	Brooklyn
Metropolitan Hospital	Manhattan
Bellevue Hospital	Manhattan

Quarantine Station:

Swinburne Island Hospital	Richmond

This co-operation among the hospitals is a notable contribution to our progress and will probably result in some permanent plan that may be put to service on such occasions in the future.

There is nothing more discouraging than to meet with cases like the following: On coming to a house we were met by a small boy who was limping. We were led up-stairs by the boy and there we found a younger brother who also limped. We were told that the baby, which was sick, had been sent out-of-doors in the carriage. This mother had seen no physician, though all three children were in the acute stage of infantile paralysis. She did not think the children were very sick, because they got about so quickly.

There is another point of importance which shows the degree to which the medical profession will sacrifice itself to the public health. Many instances have come to my knowledge where physicians have for the time being lost their entire practice because they have been taking care of cases of infantile paralysis and their patients have been afraid to come to them. I would like to ask other physicians to see that such men do not suffer because of their willingness to sacrifice themselves for the welfare of those who have needed their services. I hope that wherever you meet this attitude of fear on the part of patients you will discourage it.

In closing, I wish to make this appeal to the medical profession, for no health department, however efficient, can control an epidemic and secure proper police enforcement of its regulations without the co-operation of the medical profession; unless there is early diagnosis and a willingness to report cases on the part of the medical profession. It is to be hoped that as a result of this meeting we will have many previously undetected cases promptly reported to the Department of Health.

MODE OF INFECTION AND ETIOLOGY OF EPIDEMIC POLIOMYELITIS—Simon Flexner (American Journal Diseases of Children, 1915, Vol. IX., p. 353) discusses the etiology of epidemic poliomyelitis. He believes that the microbic agent is present in the nasal and buccal secretions and is carried by persons, not insects, and communicated by them in such manner as to gain access to the upper respiratory mucous membranes of other persons, among whom a portion, being susceptible to the injurious action of the virus, acquire the infection and develop the disease. The clinical variety or form of the disease which they develop may be the frankly paralytic, the meningitic, or the abortive and ambulatory, in which no severe symptoms whatever appear. But however the persons may be affected, they become potential agents of dissemination of the virus of poliomyelitis, as do a number of healthy persons who have been in intimate contact with those who are ill, and another group of persons who have recovered from an acute attack of poliomyelitis. These several classes of infected or contaminated persons constitute the active means through which the virus is spread and to the control of which sanitary measures designed to prevent epidemics must be directed. The virus or microbic agent of epidemic poliomyelitis appears to have been cultivated and to consist of minute globular bodies, capable of being distinctly viewed under the high powers of the microscope.—*The American Journal of Obstetrics.*

ABORTIVE AND NON-PARALYTIC CASES OF POLIOMYELITIS—THEIR IMPORTANCE AND THEIR RECOGNITION *†

BY GEORGE DRAPER, M.D.
New York

The title of this part of the discussion on poliomyelitis is not quite what it should be. Cases were formerly designated as abortive when attention was centered on the paralysis as the chief symptom of poliomyelitis, but as our knowledge has grown it has become increasingly evident that in dealing with acute anterior poliomyelitis we are dealing with a general infection that presents a great variety of manifestations. The cases that escape paralysis are just as much true instances of poliomyelitis as the paralyzed cases and infinitely more dangerous. The cases that have hitherto been called "abortive" should be called "atypical," if we consider those that develop paralyses as typical. Unfortunately there is no possible way at the present time of determining the number of cases that are not paralyzed. The figures vary greatly and undoubtedly the number of cases that are not paralyzed varies greatly in different epidemics. There are certain indications, however, that lead us to believe that the number of cases of this type is considerable. It has been said that it is extremely rare to see more than one case of poliomyelitis in a family, but a very careful investigation where there has been one case in a family frequently shows that another child has had mild symptoms, as fever, general malaise and vomiting. Furthermore, pathological studies show that there may not only be lesions in the spinal cord, but that the parenchymatous viscera and the entire lymphatic apparatus may be involved and we may find palpably enlarged lymph nodes. All these facts form additional evidence that we are dealing with a general infectious disease.

In general, all cases fall into the following groups: (1) Gastrointestinal. (2) Respiratory. In these we may have the symptoms of influenza, cough, lung signs, and pains in the bones

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and joints. (3) Febrile. (4) A type characterized by symptoms of meningismus. (5) The type in which paralysis occurs. In the first four types we may have slight transient paralyses. In the type showing paralysis we may have as prodromal symptoms any or all of the symptoms of the other types. The intensity of the symptoms is no guide to the prognosis. In this connection it is of interest that in fatal cases more extensive lesions of the cord have sometimes been found than were indicated by the symptoms. That there should have been this general degeneration of the cord without manifestations suggests that we may have lesions in the milder cases that do not give clinical evidence of their existence. In times of epidemic every one is alive to these symptoms, but it is not enough that the physician should say, from clinical observation, this is or is not a case of poliomyelitis. In suspicious cases lumbar puncture should be made and the spinal fluid examined. There is usually an increase in the lymphocytes and a very large percentage of polymorphonuclears, which are replaced within twelve to twenty-four hours by mononuclears. In three or four days we have a pure lymphocytosis. The albumin and globulin content of the fluid are increased, but less than in tuberculous meningitis.

The diagnosis is suggested by gastrointestinal, respiratory and febrile symptoms. Where we find these a search should be made for transient weakness and mild degrees of paralysis, and for local muscle tenderness. One point of value in diagnosis is the anterior spinal flexion sign. It is a very striking thing that before paralysis sets in the spinal flexion sign is definitely present, and this is probably responsible for the stiff neck and Kernig's phenomenon. The sign is elicited by flexing the trunk forward, doubling the child anteriorly so that head and hips approach.

In conclusion, it may be said that there is no question but that these atypical cases of poliomyelitis exist. They must be recognized, and herein lies the problem. In learning to recognize them a double advantage will result. They, as moving sources of contagion, will be controlled, and cases which are destined to be paralyzed will be recognized in the preparalytic stage, and with the advent of a specific therapeutic agent possibly saved from an oncoming paralysis.

116 East Sixty-third Street.

THE PRESENT EPIDEMIC OF POLIOMYELITIS—THE TYPES WHICH IT PRESENTS *†

BY LOUIS C. AGER, M.D.

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It will be readily understood that, with the amount of clinical work that has had to be accomplished during this epidemic, the staff has not had time to digest the large amount of data that is being accumulated. The data will be studied and put into proper condition for presentation at some future time. I think that much that is suggestive will be brought out from our experience in the hospitalization of such an immense number of cases. This will be appreciated when it is recalled that from June 20th until July 12th we cared for 320 patients with poliomyelitis in the Kingston Avenue Hospital. On July 3d, 89 cases were admitted. The most striking feature during these early days was the change observed in many of the children as the result of the facilities offered for making them comfortable in the hospital. Although hospitalization was primarily a public health move, the beneficial effect on the children themselves justified it.

The infectivity of the disease has been widely discussed, but the degree of infectivity has not yet been decided. Dr. Draper spoke of the large number of abortive cases, and we have more proof of the infectivity of these patients than we had from the epidemic of 1907. For example, I would like to report the following: On July 2d a child was taken sick with convulsions, vomiting and fever and recovered. On July 3d another child in the same family was stricken with the acute fulminating type of the disease and died within forty-eight hours. On July 4th an older member of the family developed the disease. A second group of cases was as follows: On June 29th a child became ill with the abortive type. On June 30th a second child came down with the fulminating type of the disease and death followed. On July 5th a third case occurred in this same family, which, in this instance, was followed by paralysis. It is evident that there must be a large number of cases of the abortive type that are not recognized. In the Kingston Avenue Hospital we have at least eight series of cases where there have been two or more cases in the same family. A great many more instances of this kind would have been found in 1907 if we had had more complete statistics. About the only other figures that we have on this point are those published by Wickman and Medin.

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* **Read at a Special Meeting on Infantile Paralysis, held at the New York Academy of Medicine, July 13, 1916.**

† **Special stenographic report corrected by the author for ARCHIVES OF PEDIATRICS.**

That there are practically no cases among the colored is borne out by our experience at the Kingston Avenue Hospital. Some investigators have tried to find a relationship in the incidence of the disease in dark and light people, but no such relationship has been traced. The incidence of the disease is likewise practically the same in all nationalities, depending upon the degree of personal contact.

Enlargement of the Liver and Spleen—This is a systemic infection and, like miliary tuberculosis in small infants, may involve the entire system. We found only 2 cases of enlarged liver and spleen in 67 cases.

The age incidence in the present epidemic is practically the same as in the epidemic of 1907. It is a peculiar fact that in epidemics in this country the age incidence is lower than that in Europe. As the epidemic progresses the number of older patients is increasing. In 81 cases 46 occurred between the ages of two and five years; 22 between the ages of one and two years; 8 between the ages of six and twelve, and 3 between one and six months. We had 2 adult cases in this group—one in a woman twenty-eight years of age and one in a pregnant woman of twenty-one years.

Types of the Disease—In our clinical work we have distinguished three types—the encephalitic and the myelitic, to differentiate between the muscles supplied by the cranial nerves and those supplied by the spinal nerves, and the meningitic. This is not an attempt to improve on Wickman's excellent classification, but we have found it valuable for bedside work. We find, as usual, that the lower extremities are most frequently paralyzed. In a group of 64 cases examined the lower extremities were involved in 39 instances; in 7 instances the upper extremities; in 5 there was facial paralysis, and in 13 cases the only definite symptom was marked paralysis of the muscles of the back. There were 2 typical ataxic cases.

Special Types—Of course the fulminating fatal cases gave the most pronounced symptoms. We had one peculiar and unusual case in a boy of eleven years. He was a well-nourished, well-developed child, and when brought in his only symptom was markedly labored breathing. He asked for a drink of milk and it was noticed that there was a slight blur to his speech. He was unable to drink on account of pharyngeal paralysis. His diaphragm was completely paralyzed. The labored breathing was accomplished by the thoracic muscles alone. He stood up in his crib and was able to use his arms and hands, and his back showed no evidence of paralysis. He gradually became weaker and died five hours after entering the hospital. Another case of the fulminating type showed a general paralysis; practically all the skeletal muscles were affected, and there was marked respiratory paralysis. In both of these cases the heart was not affected. We have been trying artificial respiration immediately after death and in some instances have succeeded in bringing back the color after death had apparently set in. We still hope that in some cases something may be accomplished by this method. We employed the apparatus which Dr. Meltzer has been using at the Rockefeller Institute. An interesting thing in connection with this epidemic is that on the diphtheria service there are frequent "croup calls," that is, summons to intubate, which proved to be respiratory paralysis of poliomyelitis.

Meningitic Type—We had one boy who was wildly delirious. He had complete paralysis of one leg and one arm and was totally blind. There was an alteration in his condition from deep meningeal coma to active maniacal delirium. These meningitic cases are difficult to differentiate from other forms of meningitis, and we have had at least two cases of tuberculous meningitis sent in by mistake.

It is extraordinary to see the rapid improvement in some cases. We have had small bottle-fed babies who were unable to take their milk at first and are now able to hold the bottle and feed themselves. As noted by other observers, we find that many of the cases showing the most diffuse paralysis early in the disease make the most rapid and complete recovery.

In conclusion, I may say that this experience has absolutely convinced me that the only place to take care of children with poliomyelitis is in a hospital, unless the conditions of the hospital can be exactly reproduced in the home.

137 Clinton Street.

LABORATORY AIDS IN THE DIAGNOSIS OF POLIOMYELITIS *

BY JOSEPHINE B. NEAL, M.D.

Department of Health, New York

It is well known that sporadic cases of poliomyelitis are frequently seen when no epidemic exists. Because of this fact, during the past six years, it has been the lot of the Meningitis Division of the Department of Health to study both clinically, and by means of laboratory methods, many cases of this disease before the present epidemic occurred. Most of the cases seen by us, both before and during this epidemic, have been atypical and we have, therefore, been compelled, when endeavoring to make a diagnosis, to consider our laboratory findings with more than ordinary care. As with most such procedures, the answers which the laboratory returns to our questionings furnish us with evidence that is corroborative only and by no means absolutely diagnostic. Perhaps one of the most interesting experiments employed in the study of poliomyelitis has been the inoculation of monkeys by means of washings from the respiratory and elementary mucous membrane. This was first successfully performed by Kling, Petterson and Wernstedt in 1911. It has since been repeated several times. Dr. DuBois, Dr. Zingher and I obtained washings from the nose and throat from an abortive case two weeks after the incidence of the sickness. With these we produced typical poliomyelitis in monkeys. In sections of the brain, from one of these monkeys, a few globoid bodies similar to those discovered by Flexner and Noguchi were seen. A report of this work appeared in the Journal of the American Medical Association of January, 1914.

Another laboratory method of some diagnostic value is the so-called neutralization test. In this, serum from the suspected case in the stage of recovery is mixed with a known fatal dose of an active virus. These are incubated and later injected intracerebrally into the monkeys. Failure of the disease to develop indicates that the virus has been neutralized. This test, however, does not furnish conclusive evidence of poliomyelitis for sera

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* Read at a Special Meeting on Infantile Paralysis held at the New York Academy of Medicine, July 13, 1916.

from those known to have been free from a recent attack of the disease has sometimes successfully neutralized the virus. It is, however, quite obvious that laboratory methods requiring the use of monkeys are both too complicated and too expensive for ordinary diagnostic use.

A study of the blood picture was exhaustively made by Peabody, Draper and Dochez, of the Rockefeller Institute. It was shown that there existed a varying increase in leukocytes and a polymorphonucleosis. This is found in so many other diseases that it is of little help in diagnosis.

The procedure which we find to be our most reliable and valuable aid in the recognition of poliomyelitis is the examination of the spinal fluid. In the first twenty-four to forty-eight hours after its onset, poliomyelitis must be differentiated from the early stages of epidemic meningitis or mild purulent meningitis and also from a meningism accompanying pneumonia or other infection. The clinical pictures presented by the above-mentioned diseases are quite similar and it is in the distinguishing between them that the examination of spinal fluid affords us the most valuable information. In the early stages of poliomyelitis, the spinal fluid is clear or, rarely, it may be slightly cloudy. It often shows a good fibrin web formation. There is a slight to moderate increase of albumin and globulin and also of the cellular elements. The reduction of Fehling's is prompt. Those poliomyelitic fluids which are cloudy present a polymorphonucleosis, which may run as high as 90 per cent., but which we usually find to be about 60 per cent. As a rule, however, 80 per cent. or more of the cells are mononuclears. In examining such fluids we have frequently observed the presence of large mononuclear cells which we believe to be in a measure characteristic of poliomyelitis. We are now studying these by means of the various differential stains in the hope that our research in this direction may develop something of positive diagnostic significance.

Two rare types of spinal fluids sometimes occur in poliomyelitis when the hemorrhagic process has been more than usually extensive. The first of these is of the true hemorrhagic character, the red blood cells being evenly diffused throughout the fluid. When collected in successive tubes, the specimens are all hemogenous, showing no change in the intensity of the hemorrhage. This serves to differentiate it from bloody fluids obtained by the accidental puncture of a vein. The second of these rarer fluids illustrates the so-called syndrome of Froin. It has a characteristic yellow color and coagulates spontaneously. As these fluids are found in other conditions, they are not pathognomonic of poliomyelitis.

In making our differential we must remember that the spinal fluid from early cases of purulent meningitis shows a varying degree of cloudiness, except in very rare instances, when it may be clear. A greater increase in albumin and globulin is usually found here than occurs in poliomyelitis with a poorer reduction of Fehling's. The cells in these fluids of purulent meningitis are 90 per cent. or more polymorphonuclears and the etiologic organism is found except in the mildest cases. The percentage of polymorphonuclears in cloudy fluid of poliomyelitis is usually less. In certain mild cases of meningitis, probably of epidemic variety, the meningococci may never be positively demonstrated in the fluid. In purulent meningitis due to other organisms the organisms practically always appear later as further lumbar puncture becomes necessary. In one instance I have seen a clear fluid from an early case of epidemic meningitis. This was of about eighteen hours' standing. Although the cellular reaction was so slight, the meningococcus was demonstrated to be present in the fluid by smear and culture.

The fluid in meningism is differentiated by the fact that it is increased in amount, but practically normal in character.

When seen a week or more after the onset, cases of poliomyelitis, especially if presenting cerebral symptoms, must be differentiated from tuberculous meningitis. The spinal fluid in both these conditions is clear and increased in amount. The albumin and globulin content of both is also increased, but usually in poliomyelitis, the increase of both these last-named elements is not so great as occurs in tuberculous meningitis. The reduction of Fehling's is usually better and, here let me say, that many tuberculous fluids give a good reduction of Fehling's, though the contrary has been stated. The cellular element is also usually less in poliomyelitis. In both conditions at this stage there is ordinarily a mononucleosis, although in some acute cases of tuberculous meningitis there is a polymorphonucleosis. If, however, as *may* happen occasionally, the increase of albumin and globulin is greater than usual and the reduction of Fehling's is not so prompt, then the determination of the disease must wait upon the results of animal inoculation if it has been impossible to demonstrate tubercle bacilli in fluids.

In brief, then, a spinal fluid increased in amount and showing a slight to moderate increase in albumin and globulin, a good reduction of Fehling's and a varying cellular increase, mostly mononuclear, makes the diagnosis reasonably certain in fairly early cases of suspected poliomyelitis. A slightly cloudy fluid occurring very early in the disease must be differentiated, as noted above, from a similar fluid in an early purulent meningitis. Fluids from the cerebral or encephalitic type of poliomyelitis sometimes may be differentiated from fluids of tuberculous meningitis only by animal inoculation.

ENDOCARDITIS IN CHILDREN: ITS PROPHYLAXIS AND TREATMENT IN AN OUT-PATIENT DEPARTMENT—R. S. Eustis (Boston Medical and Surgical Journal, 1915, Vol. CLXXIII., p. 348) writes a preliminary report after nine months' study of the above subject. The questions before him are two in number: First, is it possible to treat heart cases with prolonged rest at home with only such supervision as can be carried out from a hospital outpatient department? To this question the author returns an answer in the affirmative, provided that some such method as he details is employed. The second question which he sets himself is—Does this prolonged rest prevent the development, or moderate the severity, of chronic heart disease in later life? To this question, which most regard as settled, the author is not yet prepared with a reply from his own experience. The supervision from the out-patient department is conducted partly by the doctor in charge and partly by a social worker, who visits and reports on the home treatment of each case on the lines of a tuberculosis "dispensary" in this country. The paper hardly brings out sufficiently clearly, perhaps, the importance of estimating the presence or absence of *active* rheumatic infection before drawing conclusions about the value of rest or any other line of treatment. Taking all cases, the author regards the percentage of his series in which endocarditis was present as 25 per cent. or less. Taking only such cases as were not regarded as showing endocarditis when first coming under treatment, he finds that only 6.8 per cent. developed it, while 18 per cent. more were grouped as "suspicious."—*The British Journal of Children's Diseases.*

ORTHOPEDIC OBSERVATION IN THE TREATMENT OF ANTERIOR POLIOMYELITIS

BY CHARLTON WALLACE, M.D.

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In studying a series of cases in the epidemic in New York City in 1907, 541 cases were analyzed at the Hospital for Ruptured and Crippled, but only 298 subsequent records could be obtained after a lapse of five or six months from the onset.

CASES OF POLIOMYELITIS FROM DECEMBER 16, 1907, TO MARCH 27, 1908

Cases seen in clinic	541
Records obtained at homes	298
Cases not found at address given	114
Not at home when visited	63
Cases moved	66

Occurrence	Cases
June, 1907	22
July, "	68
Aug., "	94
Sept., "	82
Oct., "	19
Nov., "	9
Dec., "	3
Jan., 1908	1
Total	298

Age at Onset	Cases
1 year	30
2 years	129
3 "	77
4 "	36
5 "	9
After 5 years	17
Total	298

After 5 years	Cases
6 years	6
7 "	2
8 "	3
10 "	3
11 "	2
12 "	1
Total	17

PARTS AFFECTED

INFANTILE PARALYSIS EPIDEMIC, 1907—VISITED WINTER 1907-1908

Lower extremities alone	228
Upper extremities alone	22
Lower and upper extremities	22
Complete paralysis, back, etc.	1
Absolute recoveries	25
Total	298

The tables illustrate the following points:

(1) Twenty-five patients made complete recovery and should be called abortive.

(2) A study of the months of occurrence of the disease shows that it reached the height of its curve in August.

(3) The age incidence of attack was greatest between one and two years.

(4) 83.89 per cent. suffered permanent paralysis of some muscles in the lower extremities, which illustrates that the toxins have a selective action on the cells of the lumbar segment of the cord.

(5) The difficulty in locating clinical cases in New York City, even after the short period of six months.

It is rather hard to divide those afflicted with anterior poliomyelitis into distinctive stages, but one might venture to classify the periods for clinical purposes into the stages of: (1) onset, (2) apparent paralysis, (3) recovery or convalescence, (4) readjustment or permanent paralysis.

Abortive cases frequently occur, but these are seldom seen by the orthopedist.

The patients that survive an acute attack of anterior poliomyelitis present mechanical problems almost from the start. This is especially so when there is severe pain referred to the joints.

The orthopedic treatment during the acute stage is generally aimed at the relief of the pain, and at prohibiting communication of nerve impulses to or through the congested nerve cells. This is best accomplished by absolute rest and immobilization in plaster-of-Paris dressings supplemented by careful judicious nursing and by keeping the patient in a sunny, well-ventilated room, which may minimize the amount of permanent damage to the cells. The author concurs in the opinion that quarantine should be enforced for six weeks.

The stage of apparent paralysis is the period immediately following the onset. There seems to be complete disability of many groups of muscles, but several of these supposedly paralyzed muscles later regain their power. Prolonged bed-treatment for two or three months is indicated if the onset is severe. Daily sponging with alcohol and skin rubbing to avoid decubitus should not be forgotten. Hot fomentations and baths should be given for the pain during the first week or ten days. In the Bulbo-spinal type the patient should be placed upon a mattress resting on a fracture board. All movements should be restricted, especially any attempt to sit up. When this type occurs in a child it may be necessary to put on a back brace with limb parts attached, or to resort to a plaster-of-Paris dressing extending from axilla to toes, so that movements may be controlled. This checks the beginning of severe back deformities, which are most difficult to correct.

Such a deformity is seen in Fig. 1 of a neglected case. This patient's onset came at the age of one and one-half years. She was wearing braces on both lower extremities when seen four and one-half years later, but had received no treatment for her back.

In patients where the back muscles have escaped and the paralysis has affected only the

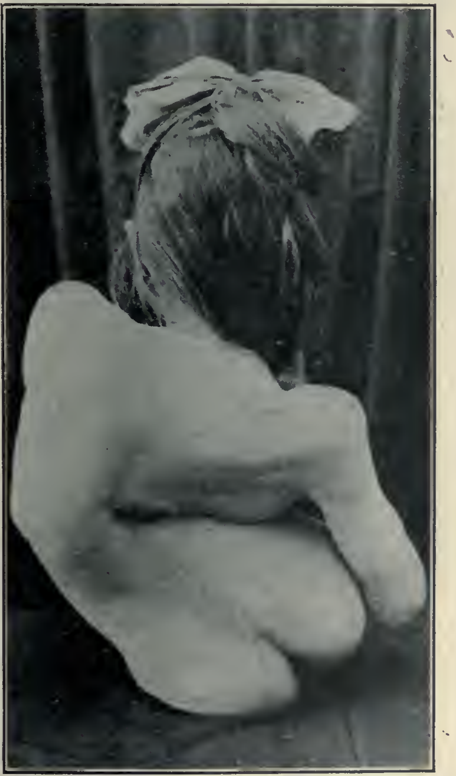

FIG. 1—Neglected back case following acute attack of Anterior Poliomyelitis. (St. Charles' Hospital)

lower extremities, the application of plaster-of-Paris bandages to the feet is indicated. These not only prevent contractures of the feet, but by their weight are an aid in preventing contractures at the hips and knees.

The stage of recovery or convalescence, for our purposes, extends from the beginning of the ambulatory period to the end of the first year. During this time every endeavor should be made to maintain muscle balance and to stimulate the paralyzed muscles. Daily massage, manipulations and stretchings of the active muscles should be performed. Over-bracing is preferable during the early months, after which it should gradually be diminished, as the strength of the part returns. Braces are used to protect against over-strain of paralyzed muscles, stretching of the ligaments about the joints, and to avoid contractures. Electro-therapeutics may be of some value and should be utilized during the first year.

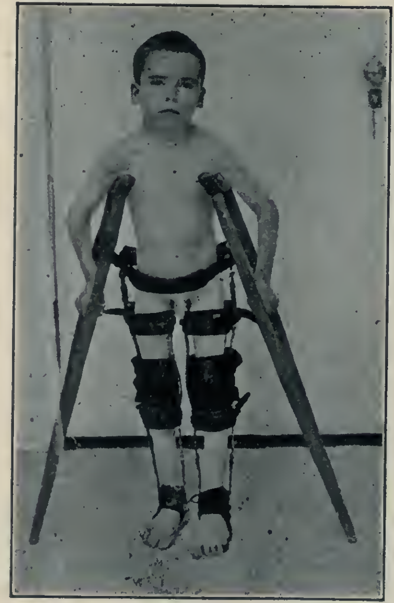

FIG. 2—Represents treatment when many muscles in both lower extremities are paralyzed and back weak. (St. Charles' Hospital)

Fig. 2 illustrates the use of braces and crutches, to encourage locomotion in a case of paralysis of both lower extremities.

In the readjustment or permanent paralytic stage, the exact muscles involved may be determined by the loss of voluntary contraction, muscle atrophy, and reaction of degeneration. Braces should then be carefully selected and fitted, the object being to support the disabled member and to encourage its functional use under protection. The joints of the supporting apparatus should be made so that motion is permitted in the direction of the muscles which are paralyzed. This allows their shortening and prevents their being stretched by their healthy opponents. The aim here also is to maintain muscle balance and avoid weakening of the ligaments about the joints. Fig. 3 illustrates braces of this type.

Every attempt should be made to encourage functional use of the affected part in a physiological attitude, but the author believes that muscle education is contraindicated. The maintaining of the latter may seem superfluous, but it has been frequently prescribed by others and has aggravated the deformity by over-developing the normal muscles. The attempts to train and develop the paralyzed muscles are not only useless and wasteful, but are detrimental. Patients have been seen to whom setting-up exercises have been given for their backs, when the loss of power had occurred on one side of the vertebral column. A very pronounced over-development of the muscles on the unaffected side resulted, and vicious rotary-lateral curvature was the outcome. The sane treatment of these backs is prolonged recumbency in the spine position during the early months. It is generally necessary to support the spine when the erect attitude is assumed, either by a plaster-of-Paris jacket or a brace, preferably the former.

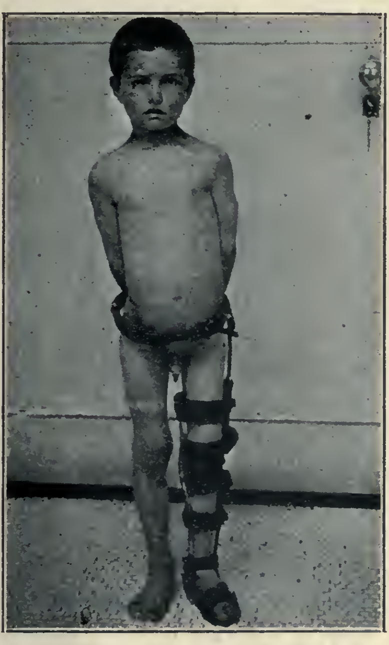

FIG. 3—Brace used for paralysis of muscles about the hip, knee and foot. (St. Charles' Hospital)

CASE NO. I. Female, seventeen years of age, seen in consultation with Dr. Staub, New Preston, Conn., October 12, 1911.

History—Had always enjoyed good health and participated in all branches of sports, horseback riding, tennis playing and swimming. So far as could be found out, had not been exposed to any case of infantile paralysis, but three days previous to onset, October 1, 1911, had visited New York City to do some shopping preparatory to going to boarding school. Competed in tennis tournament October 1st and that night was suddenly taken ill with severe vomiting, elevation of temperature and loss of power of the muscles of the neck, back, both upper and lower extremities and one side of the face, accompanied by severe pain in all the joints.

Examination—(in bed) October 12, 1911—Unable to raise head or move any of the extremities. Apparently total paralysis from the neck down to the toes. There was twitching of one side of the face.

Medication was thorough catharsis, aspirin and potassium iodide, and plaster-of-Paris foot dressings were applied, extending to the knee. The patient was placed upon a fracture bed, and all feeding was administered by the nurse.

At the expiration of eight weeks patient was removed, in recumbency, to her Jersey City home, and the above treatment was continued, except for the medication. Absolute quarantine was enforced during the first six weeks, in a thoroughly ventilated room, care having been taken to keep the body warm. Several small children in the family, but none of them were infected. This patient was not allowed to sit up until February 22, 1912, when massage and electricity were begun and continued throughout the first year. No back support was prescribed, as she could hold herself erect when assisted with crutches.

May 21, 1912: There was drooping of one side of the lower lip, power recovered in both upper extremities. The muscles on the right side of the vertebral column were weak, but the patient was able to walk across the floor with the aid of crutches and a brace to the knees, on both legs, without any joints at the ankles.

August 8, 1912: Condition of the patient is excellent and she walks very well without crutches, wearing short double upright brace with limited joint on left foot and stop joint on right. All motions of left foot about normal except plantar flexion, which is due to the weakened tendo-achillis. Right foot, all motions are lost, except plantar flexion and faint suspicion of adduction.

Patient stands with back practically normal, but upon careful inspection one can detect a right concavity. The muscles on the left side of the back stand out a little more prominently than those on the right.

Patient was instructed to wear her braces all of the time when walking out-of-doors or on uneven surfaces, but on certain occasions to omit them and wear specially constructed shoes. A moderate amount of dancing to be permitted.

January 7, 1913: Abduction, adduction and dorsal flexion of the left foot are good, but there is a tendency to calcaneous. In the right foot the tendo-achillis was over-active and adduction and dorsal flexion were absent. More positive instructions were given concerning manipulations for the right foot, to overcome the tendency to contracture of the tendo-achillis. Instructed to continue braces and shoes, but can walk well without these.

February 18, 1913: Measurements of the right calf, 13; left calf, 12. Right foot, dorsal flexion just to a right angle, adduction absent and abduction only to a few degrees. The left foot makes all movements fairly well. Attitude of the right foot in standing is much improved and the attempt of the tendo-achillis to overact has disappeared. General condition of patient is excellent.

Braces omitted upon this date and patient to be observed. Back is in a very good attitude.

June 3, 1915: Patient walks with decided left limp, right shoulder is carried higher than left. The carriage of the trunk is excellent and except for the limp there is no noticeable disability.

May 12, 1916: The left lower extremity is three-quarters of an inch shorter than the right. The back is in very good condition and is almost perfectly symmetrical, except under close observation it can be detected that the muscles on the right side of the spine are weaker than those on the left. No artificial support has been worn since February, 1913.

The ultimate result of this case has been perfectly satisfactory and it demonstrates the desirability of ultra-conservative treatment.

The foregoing conservative measures carefully used and the prolonged observation of the patients would lessen by 20 per cent. the number of operations required to be performed upon those once afflicted with infantile paralysis. The impatience of the family to see the patient walk without artificial support or the dread of having braces seen upon the child are perhaps the two principal reasons for the existence of so many contractures. Great benefit has been given to the patients with the deformities and the disabilities following an attack of infantile paralysis by operative procedures. The most frequent deformities seen are the contractures of the flexor muscles of the foot, knee and hip. It sometimes happens that multiple contractures occur in one patient. The attempt to cut or stretch all of these in one sitting is inadvisable. The following will illustrate:

Female, twenty-six years of age, presented herself for treatment on December 6, 1907, and was admitted to the Hospital for Ruptured and Crippled. She had never walked or stood up but was able to sit erect.

Examination—General condition good and there were severe flexion deformities at both hips, knees and feet. There was considerable muscular atrophy and there was left genu valgum. There were contractures of the flexor and adductor muscles of both hips, the hamstrings of both knees and the achillis tendons of both feet.

December 10, 1907: Subcutaneous tenotomy of the right tendo-achillis and the left one was stretched. The plantar fascia was also cut. Plaster-of-Paris applied with feet deformity corrected.

January 13, 1908: Feet at right angles and in good position.

January 14, 1908: Both hamstrings tenotomized on the right side and the biceps on the left. Attempt made to forcibly extend the legs, but partial correction only was obtained. Plaster-of-Paris dressing extended from the upper third of thigh to toes. The feet still held at angle of about 90 degrees.

February 4, 1908: Plaster-of-Paris dressing removed and all of the resisting muscles beneath both anterior superior spinous processes of the ilium were cut subcutaneously and the thighs were extended forcibly. Then a double long plaster-of-Paris spica was applied.

April 1, 1908: Plaster-of-Paris was removed and massage given.

April 15, 1908: Feet were stretched to a little less than 90 degrees and the left knock-knee was overcome by traction and manipulation. Plaster-of-Paris applied to the left knee and both feet. Posterior leg brace was put on the right side and massage given.

October 18, 1908: Pair of long braces adjusted to the patient similar to those shown in Fig. 2, no joints at the ankles or knees. Crutches also were prescribed, massage to be continued.

November 18, 1908: Has been able to stand with the aid of crutches and has taken a few steps. The patient was told that she could not go home until she was able to walk the length of the ward. Massage continued.

February 2, 1909: Discharged, deformities corrected and walking with the aid of the braces and crutches (as in Fig. 2).

Subsequent reports from this patient are that she walks around out-of-doors, but continues to use the crutches and braces.

This was the worst case of contractures ever seen by the author, but shows what persistent, painstaking operative work can accomplish.

OPERATIVE CASE. No. 2. February 21, 1916. Male, six and one-half years old. He had onset of acute anterior poliomyelitis during November, 1912, in Cincinnati, O. The previous treatment had been massage, osteopathy and electricity. No braces were used, because those in charge of the patient did not believe in them. His method of locomotion was one of crawling on his hands and knees, the skin of which was similar to that on the soles of the feet. Since the development of the contractures various orthopedic surgeons had advised operating and bracing.

Examination—Was able to sit erect and get about on all fours. The muscles of both upper extremities and back were normal, but the only active ones in the lower extremities were the tensor fascia femori, which were in contracture. There was subluxation of the left hip and the heads of both tibiæ were partially displaced backward. The thighs were held in flexion at an angle of 135 degrees with the trunk, and the legs held flexed at the knees at 140 degrees. Except for the attitude at the hips and knees the patient had what is termed "dangle lower limbs."

March 2, 1916: All constricting bands and muscles immediately beneath the anterior superior spines of the ilii were cut subcutaneously. Severe force was necessary in order to obtain extension at the hips and knees and a double long plaster-of-Paris spica was applied in the corrected position.

July 10, 1916: The attitude of the hips and knees was satisfactory and astragalectomy operations were performed on both feet, hoping thereby to give him a good foundation to stand upon.

Attention is called to this child in order to show what a prejudice against braces can accomplish. Such an equipment as shown in Fig. 2 would have enabled him to have continued walking uprightly and the operations at the hips and knees would not have been required.

OPERATIVE CASE. No. 3. Figs. 4 and 5. Admitted to St. Charles' Hospital July 19, 1912. Age, seven years. Onset several years previous, but exact date not known. On admission the boy was unable to walk without braces.

Examination—The left foot was in varus and the right foot in valgus. There was paralysis of all muscles of the left leg, except the tibialis anticus. On the right side the tibialis anticus was alone involved.

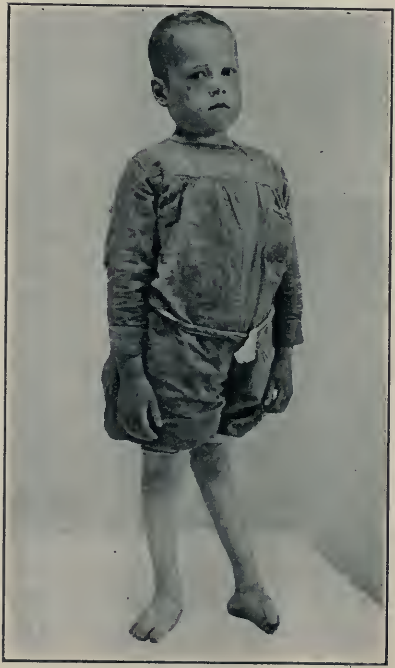

FIG. 4—Right valgus and left varus deformity following Anterior Poliomyelitis. (St. Charles' Hospital)

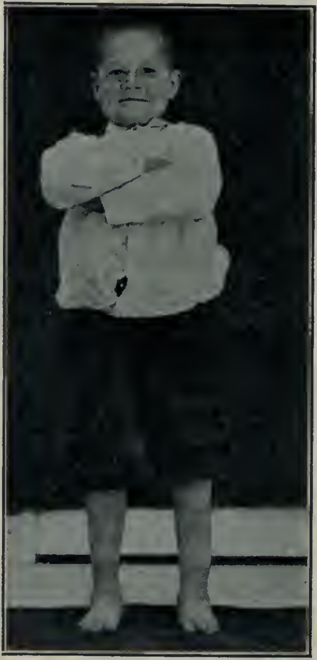

FIG. 5—Attitude of feet of Fig 4 after operation. (St. Charles' Hospital)

July 14, 1913: Typical Whitman operation on the right foot.

November 2, 1914: Left astragalectomy and transplantation of tibialis anticus to the middle cuneiform bone.

The result is that patient is now able to walk without apparatus and both feet are in good position. The circulation of the feet was greatly improved.

OPERATIVE CASE. No. 4. Male, seven years old, seen April 1, 1913. Onset in 1907, in Ridgewood, N. J. In the early part of September of that year he had a convulsion, but no temperature or loss of power. Two weeks later he had a rise of temperature and it was found upon the third day after this that there was loss of power in both lower extremities and left shoulder. Patient had had orthopedic care and both tendo-achillis had been tentotomized. When examined on the above date was wearing two short leg braces.

Examination—Shoulders and back in good condition. Thighs healthy and well developed, but there is some tendency to knock-knee. Right foot has severe cavus and varus deformity. External malleolus was rotated to the rear. There was paralysis of all the muscles in this foot, except the adductors and slight power in the tendo-achillis remained. Left foot was in the attitude of valgus, but there seemed to be some power in the anterior tibial, which was the only active muscle on the dorsum of the foot.

Short leg braces were continued, but it was recommended that an astralgalectomy, with tendon transplantation, be performed on each foot in order that the braces might be discarded and more desirable members obtained.

January 12, 1915: Left foot operated upon. Crescent-shape incision was made from above and behind the external malleolus over to the head of the astragalus. Peroneal tendons exposed and cut near their insertion, secured with artery clamps at the proximal end. External annular ligament and soft parts were then cut through, except muscles of dorsum of the foot, and the astragalus was exposed. The muscles of the dorsum were pulled aside, the foot strongly adducted and the astragalus was then enucleated. A wedge notch was made in the outer border of the os calcis near its anterior end. The anterior tibial muscle was located and a silk suture passed around it. The articular surfaces of the external and the internal malleoli were denuded. The sustentaculum tali was excised from the inner border of the os calcis and the anterior tibial tendon was put on tension and freed from its insertion. This also was clamped. The peroneal tendons were sutured into the outer border of the os calcis and the anterior tibial was sutured to the middle cuneiform bone and the malleoli were pushed forward so that the articular surface of the fibula fitted into the pocket made in the os calcis, and the internal malleolus placed where the sustentaculum tali had been. The wound was closed by continuous skin sutures.

The foot was held with the malleoli moved forward, as before described, and in equinus, and the leg was flexed at the knee. In this attitude the member was held fixed in plaster-of-Paris and kept elevated on a plane above the trunk for ten days. The bandages were worn for about eight weeks.

April 24, 1915: The same operation was repeated on the right foot. A three-quarters of an inch cork wedge was worn in ordinary shoes for several months after the omission of the plaster-of-Paris bandages.

March 25, 1916: The patient has been able to participate in the games of boyhood and the strength of the transposed muscles enable him to skip and run on his toes.

Many muscles have power, which have been supposed to be paralyzed, because severe contractures have prevented their activity. This is especially true of the contractures of the tendo-achillis. It has not been uncommon to have witnessed the restoration of dorsal flexion of the foot after having tenotomized the tendo-achillis.

It is the opinion of orthopedic surgeons that five or six years should elapse after an attack of poliomyelitis before any definite operative procedure should be employed, except in cases where contracture exists. This is advocated so that nature may have a chance to perform her healing functions.

A number of other excellent operations have been suggested, but the author has only mentioned a few which, in his opinion, might be of help.

11 East Forty-eighth Street.

MICROSCOPIC EXAMINATION OF DIPHTHERIA BACILLI—Nielsen (Hospitalstidende, Copenhagen, March 3, 1915, Vol. LVIII., No. 9, pp. 201-224) examined under the microscope smears from 215 patients entering the hospital for suspected diphtheria or scarlet fever. Cultures made from the same smears gave positive findings in 165, and, of these, he obtained positive findings in 80 per cent. with his stain-microscopic examination. In all of the 50 negative cases the microscopic and culture methods gave parallel results.—*Journal of American Medical Association.*

THE TREATMENT OF THE ACUTE STAGE OF ANTERIOR POLIOMYELITIS

BY MURRAY H. BASS, M.D.

Assistant Attending Physician Willard Parker Hospital, New York City

Although unfortunately at the present time we have no specific remedy for acute anterior poliomyelitis, it is a mistake to declare that nothing can be done for children afflicted with this disease. It is true that we are powerless to cure cases in the sense of preventing the occurrence of paralysis in a suspected febrile case, or of reducing the severity of the paralysis after it has appeared; but we are able, on the other hand, to do a great deal to make the recovery more complete and to prevent the spread of the disease to others.

The patient should be put to bed and isolated in a quiet, somewhat darkened room, as many of the cases show marked hypersensitiveness both to light and to noise.

In spite of the apparently peculiar manner in which poliomyelitis spreads, the affected child should be rigidly quarantined. The room should be fitted with screens to exclude flies and other insects. Attendants should change their outer clothing when leaving the patient, or should be supplied with caps and gowns. They should disinfect their hands with the usual disinfectant solutions, and should occasionally spray their nose and throat with hydrogen peroxide (1 per cent.). As few persons as possible should be allowed to enter the room and children should be rigidly excluded. The excreta of the patient should be disinfected and special care should be given to the excretions from the nose and throat. Pieces of gauze should be used as handkerchiefs and burned after using.

These precautions are taken, since it has been shown that poliomyelitis can be transmitted to monkeys by means of the washings from the nose and throat of healthy individuals in contact with cases of the disease, by washings from the throats and the intestines of children suffering from the disease, and, finally, that the disease can definitely be transmitted by fomites.

The chief object to be attained in the earliest stage of the disease is to keep the patient absolutely at rest. The child should be disturbed as little as possible, in order that the inflamed portions of the nervous system may be kept quiet. Picking up the patient or moving him about must be strictly avoided, not only because the spine should be kept at rest, but on account of the pain caused by even the slightest motion. The most noticeable feature of the disease outside of the paralysis is the extreme hyperesthesia. This applies not only to the affected extremity, but also to the entire spinal region, in particular to the neck. We have seen a number of children who could not lie on their backs on account of pain when they rested on the spine. In such cases there is a marked arching of the spine, as if the child were afraid to allow the back to rest on the bed.

To insure complete rest Machol, of Munich, has recommended putting the affected limbs in plaster casts as soon as the paralysis has become evident, and leaving these in place until the acute stage of the disease has passed; also immobilizing the spine by a plaster-of-Paris jacket. Occasionally considerable relief follows this procedure.

Further relief of the pain and hyperesthesia may be accomplished by means of drugs—bromides, codein and morphine in appropriate dosage. Aspirin is also useful as an analgesic in doses of 2 to 3 grains *t.i.d.* for a two-year-old child. Local applications of heat in the form of cotton compresses or of a hot-water bag should be tried. Warm baths have been highly recommended for their sedative effect, but they would appear to do more harm than good, since they necessitate too much disturbance of the patient.

The bowels should be treated as in any acute infectious disease, and retention of urine, which occasionally occurs, must be remedied.

The appetite does not seem to suffer in proportion to the seriousness of the illness, for even in the severer forms of the disease the children partake readily of food. During the febrile stage fluids and semi-solids should be given, but as soon as this stage is past the child may have solid food. In the cases in which the muscles of deglutition are involved and in the severely toxic cerebral forms gavage may be necessary, though this is exceptional and then only needed for short periods of time. In the last mentioned type, in which emaciation is often rapid, the use of normal saline solution by rectum is highly beneficial.

Where the respiratory center is involved, life may be prolonged by the use of insufflation apparatus, artificial respiration or by galvanization of the phrenic nerve; but though we have kept patients alive for hours by these means, we have not seen any cases thus treated recover.

Even early in the disease it is of the utmost importance to guard against increasing the deformity of the paralyzed parts by allowing them to remain in improper attitudes. Drop-foot is especially to be guarded against owing to the tendency for the foot to be pressed down by the bed clothes. A frame or cradle of some sort should be employed to keep the covers from touching the foot, and the nurse should be warned against tucking in the bed clothes tight. The foot of a paralyzed extremity should be held at a right angle to the leg by means of a sand bag placed against the sole, or by a strip of adhesive plaster about the ball of the foot running up on to the leg. Such a simple contrivance may avoid a tenotomy later on. Fingers begin to show contractures within the first weeks of the disease and should be straightened gently and kept partly extended by some simple device.

Hexamethylenamin is generally recommended on account of its action as a germicide in the spinal canal. It should be used in relatively large doses and only during the first week of the illness. During its administration the urine must be carefully watched for signs of renal irritation. Its use is somewhat empirical, but in monkeys it has been shown to be of value in some cases when administered early in the disease.

The seat of the disease being in the cerebrospinal nervous system, it would appear rational to administer remedies directly into the spinal canal. This has been done by Netter, who has reported 32 cases treated by means of intraspinal injections of serum from persons who have already passed through the disease. He performed lumbar puncture and withdrew as much fluid as came away and then injected a slightly less amount of the serum. He used serum of patients who had had poliomyelitis from twelve days to eleven years before. The serum was apparently most potent when collected from persons who had suffered from paralysis three months to four years previously. A Wassermann reaction was done on each of the donors to rule out syphilis. The blood was collected in sterile flasks and was then sterilized by repeated heating. Netter injected 5-13 c.c. (depending on how much cerebrospinal fluid was withdrawn) daily for eight days. He describes several cases in which an apparently rapidly spreading paralysis was stopped at once by the treatment.

Quite recently the intraspinal injection of a solution of adrenalin has been advised by Meltzer.

Lumbar puncture alone has been advocated especially by Roemer as a therapeutic procedure. It would seem indicated in cases where there are signs of increased cerebrospinal pressure, but even in such cases we have not seen any especially favorable results following its use.

When all signs of acute inflammation have disappeared, gentle massage and passive motion of the affected parts should be begun. According to Peabody, Draper and Dochez the best guide for this is the disappearance of the pain and tenderness. Electricity may then also be employed.

Rest in bed should be insisted upon for several weeks after all apparent acute symptoms have subsided, and isolation should be continued for six weeks.

In all cases where paralysis of the larger muscles remains, expert orthopedic advice is indispensable and should be secured early.

From the foregoing it will be evident that, although there is as yet no well recognized specific treatment for poliomyelitis, much may be done to help the patient; and it is to be hoped that one of the results of the hospitalization of so many cases in the present epidemic in New York City will be some distinct advance in the therapy of this disease.

41 West Eighty-third Street.

TEST FOR OCCULT BLOOD IN THE STOOL—Wagner (Arch. für Verdauungskrankh., Vol. XX., No. 4). A little of the stool (if formed, from its central portion) is spread over a clean slide. Over this the reagent is poured. The latter consists of a bit of benzidin, dissolved in 2 c.cm. glacial acetic acid, to which 20 drops of 3 per cent. hydrogen peroxide is then added. A blue color shows the presence of blood. The test is as delicate and as reliable as any of the other benzidin tests and has the advantage of cleanliness, since it involves a minimal handling of the stool. If one wishes to exclude extraneous ferments, which theoretically constitute a possible source of error, the slide carrying the film of dried stool may be passed through the flame, as in ordinary bacteriological work.—*Interstate Medical Journal.*

SOCIETY REPORTS

NEW YORK ACADEMY OF MEDICINE

Special Meeting, Held July 13, 1916

THE PRESIDENT, WALTER B. JAMES, M.D., IN THE CHAIR

As the attendance at this meeting was far beyond the capacity of the Academy of Medicine, this meeting was held in Aeolian Hall.

THE NATURE, MANNER OF CONVEYANCE AND MEANS OF PREVENTION OF INFANTILE PARALYSIS

DR. SIMON FLEXNER read this paper. (See p. 562.)

THE CLINICAL TYPES OF THE DISEASE

DR. HENRY KOPLIK read this paper. (See p. 575.)

ABORTIVE AND NON-PARALYTIC CASES—THEIR IMPORTANCE AND THEIR RECOGNITION

DR. GEORGE DRAPER read this paper. (See p. 590.)

THE PRESENT EPIDEMIC—THE TYPES WHICH IT PRESENTS

DR. LOUIS C. AGER read this paper. (See p. 592.)

LABORATORY AIDS IN DIAGNOSIS

DR. JOSEPHINE B. NEAL read this paper. (See p. 595.)

THE IMPORTANCE OF THE PRESENT EPIDEMIC

DR. HAVEN EMERSON read this paper. (See p. 584.)

DR. WILLIAM H. PARK—I have very little to add, only one or two points that I would like to emphasize. I wish to speak along the line which Dr. Flexner has spoken. He and Dr. Noguchi have added so much that is new to our knowledge of poliomyelitis and we have been applying what they have taught us. Up to the present time we know that the sick person is the one responsible for most of the contagion and that the carrier also spreads the disease. It is not spread on any other way so far as we know. There is no known carrier as a fly or insect. We do know that the sick person, the carrier and filth that has been contaminated by the sick person or carrier may convey the contagion. If an insect is found to be a carrier it will probably be in a subordinate degree. It will be very difficult to prove that an animal that has been inoculated is a carrier of the infection. I believe that even if we could detect the carrier of poliomyelitis as we do those of diphtheria, typhoid fever and pneumonia we would not act much differently than we are doing. We have the knowledge necessary to detect diphtheria and pneumonia carriers and yet we have done little with this knowledge to prevent these diseases. It is not in lack of knowledge that the difficulty of controlling the carrier lies. From what has been done in other lines it is possible that we may learn to do more with vaccines or serums, but at the present time we have no knowledge that we can offer. We have just begun to study and to work along these lines, and it is probable that in six months from now we may be able to announce some discoveries.

DR. WALTER B. JAMES—The following question has been asked Dr. Koplik: "Would you advise the removal of adenoids or enlarged tonsils during this epidemic?"

DR. HENRY KOPLIK—I would say "No" most decidedly.

DR. WALTER B. JAMES—A doctor from the midst of the infected district has asked what the modern treatment for poliomyelitis is. Someone else has asked if it is safe to care for cases of poliomyelitis in a general hospital.

DR. HAVEN EMERSON—We have found that it is perfectly safe to admit cases of poliomyelitis to a general hospital. There all sanitary precautions are carried out and there have been no instances of doctors, nurses or attendants being infected.

DR. LEON LOURIA, Brooklyn—There is nothing to be said that has not been laid before you. I have been interested in the advances that have been presented by those who have given this subject many years of study. Your attention was especially called to those cases that do not show any paralysis. I would like to speak mainly upon this subject. The epidemic can only be stopped by an early recognition of those cases that do not lead to paralysis. We must revise our medical nomenclature, so that we may include and treat poliomyelitis without paralysis. Some cases have no symptoms of paralysis. In a few cases I have noticed a very interesting occurrence. A child would be taken ill with some indefinite febrile manifestation and sore throat. They were treated in the ordinary way and seemed to recover, only to have a recurrence in three or four days, when they would get the definite symptoms of poliomyelitis and a definite paralysis. If the disease had been recognized and the child placed in bed and given the opportunity to rest that the nervous system required and was not exposed to the additional trauma consequent upon activity, the virus would not exert as great an effect. The same treatment should apply to the abortive form of the disease as was given to the paralytic form and in this way the development of paralysis might be prevented. I have seen two or three cases in the same family. In two instances in which the disease was of the abortive type, two weeks later the disease in the same child became more severe and a definite paralysis developed with permanent deformity. There is no doubt that the disease is carried from the sick to the healthy child, while those in attendance on the sick are likely to bring the disease to others, that is, they are carriers of the disease, and they may create a foci of disease. A healthy person may travel into an infected district, become contaminated, and then implant the virus in another locality. Scientists all agree that the disease is transmitted by direct contact and thus children that are slightly ill and whose illness is not properly interpreted are a prolific source of the disease. If we are assembled here that we may be prepared to help the health authorities in their endeavor to control this disease we should be called upon as medical men to make an early diagnosis and not to take lightly those ailments that may be abortive types of poliomyelitis.

DR. SAMUEL J. MELTZER said: The several papers presented have failed to cover one essential phase and that is the treatment of the disease. The reason for it is to be found, perhaps, in the discouraging fact that there is, at present, practically no treatment of poliomyelitis. I wish to bring forward three promising therapeutic measures based essentially upon personal work. Since I have only five minutes at my disposal, my remarks must of necessity be dogmatic and very brief. My practical suggestions have to be introduced by the following considerations. Any inflammatory focus is surrounded at the periphery by zones of hyperemia, exudation and edema. Thirteen years ago, in experimenting upon rabbits' ears, we found that an injection of adrenalin reduced the entire inflammatory swelling to a very small focus in the center. The peripheral zones of edema and active hyperemia disappeared completely for some time. Several years ago Dr. Auer and I found further that an intraspinal injection of adrenalin into monkeys produced a long, lasting effect upon the blood pressure, longer than by any other method of administration; more than one hour might pass before the blood pressure returned to normal. On the basis of these observations and on the further plausible assumption that the early stages of the paralytic effects in poliomyelitis were not caused by the chief inflammatory focus, but by the peripheral zones of active hyperemia, exudation and edema, I induced Dr. Clark, then working under Dr. Flexner at the Rockefeller Institute, to make the following experiments. Monkeys dying from experimental poliomyelitis received intraspinal injections of adrenalin. The beneficial effect was most striking. Animals which were paralyzed and moribund at the time of the injection were seen several hours later eating bananas which they held themselves. The paralytic conditions were strikingly improved and the life of the animals was prolonged in some cases for several days. The animals finally died, but in this series of Dr. Clark's experiments all animals received *reliably fatal* doses of the virus. It is important to bear in mind that the mortality in human infantile paralysis is usually due to respiratory paralysis. It is highly probable that in many instances the respiratory paralysis is not produced by the chief inflammatory focus, but by the extensive peripheral zones of exudation and edema, which are surely capable of interfering with the vitality of the nerve centers controlling the respiratory mechanism. If the exudation and edema could be removed for some time, the life of a few or of many of the cases might be saved, namely, if in these cases it just happens that the ascending progress of the actual inflammation comes to a standstill. On the basis of these facts and considerations I recommend the injection of adrenalin intraspinally in every case of infantile paralysis, the injections to be repeated from four to six hours. The procedure may save life, and in surviving cases it may reduce the extent of the final lesion. There is no danger to this procedure. Monkeys stand well as large a dose as 2 c.c. in a single injection. However, in human infantile paralysis the injections should be begun with a dose of 0.5 c.c. of adrenalin, until more is learned about the effects.

There are two other suggestions I wish to make. One is to administer artificial respiration by means of the apparatus for pharyngeal insufflation as soon as the patient shows a degree of unconsciousness and respiratory insufficiency. It is an easy and reliable procedure. The second suggestion is to administer oxygen under pressure in a respiratory rhythm by an apparatus which I have recently devised and used on human beings in several instances. It abolishes rapidly cyanosis and may save life. It may even act specifically on the virus of poliomyelitis. I will not attempt to enter upon a description of either of these apparatus, nor on the mode of their application and the experience we have had with them.

MEASLES IN YOUNG INFANTS—Winter (Jahrb. für Kinderhk., Berlin, June, 1915, Vol. XXXI., No. 6, pp. 465-562) has compiled a number of cases from the literature in which the mother and infant developed measles together a few days after its birth, the infection having apparently befallen both while the child was still in the uterus. In Ballantyne's case the measles seemed to have been responsible for the premature delivery, and the child presented the typical eruption when born. In contrast to these experiences, Winter has been unable to find records of any cases of extrauterine acquired measles in infants less than five months old except in an account of an epidemic in Ireland, and this does not state the exact age of the infants, so that in some or all of the cases the infection might have been intrauterine. Sperk asserts of measles that it occurs only rarely in infants from one to three months old; between the third and fifth months in about 50 per cent., and declares that all exposed infants from six to twelve months old develop measles. These facts render interesting Winter's report of a measles eruption developing in 2 infants at the sixteenth and eighteenth days of life. There had been prodromal symptoms the day previous in both cases. The mother of the youngest babe had developed measles just one day before, but in the second case the mother did not have measles. Winter adds that as the incubation period of measles is generally accepted as from thirteen to sixteen days, the children must have become infected the first and the third days after birth.—*Journal of American Medical Association.*

JOINT MEETING

UNDER THE AUSPICES OF

THE DEPARTMENT OF PUBLIC HEALTH AND CHARITIES OF PHILADELPHIA, THE PHILADELPHIA COUNTY MEDICAL SOCIETY, AND THE PHILADELPHIA PEDIATRIC SOCEITY

TO DISCUSS

ANTERIOR POLIOMYELITIS

Thursday, July 13, 1916, at *8:30* P.M.

JOHN D. MCLEAN, M.D., PRESIDENT PHILADELPHIA COUNTY MEDICAL SOCIETY, PRESIDING

SPINAL INFANTILE PARALYSIS

DR. CHARLES K. MILLS: Experience with spinal infantile paralysis points to the fact that the disease is infectious or microbic in origin and tends to spread by at least two methods—through certain occult atmospheric or climatic influences, and by contagion. The healthy children of a family should be removed to other neighborhoods, while the sick are quarantined. Through the work of Flexner and others we know the measures which should be taken to prevent the spread of the disease by the secretions of the nasopharynx and the intestinal excretions. Good nursing plays a large rôle in the treatment of infantile paralysis in all periods of the disease. Rest of body and mind is in the highest degree important. The virtue of a quiet and composed manner should be remembered by the nurse and enforced by the physician. Light and sound should be excluded during the acute febrile stage; also insect life. The method of handling the patient counts for much, especially in cases in which meningeal irritation or inflammation is prominent. The closest attention should be paid to keeping clean the nose and throat by gentle spraying with solutions of hydrogen peroxide or other germicidal solutions. Attention should also be paid to the intestinal excretions. With the appearance of paralysis and contractures the limbs should be kept in positions less liable to lead to subsequent deformities. Massage should not be used until the fever has largely disappeared; at first, simply as gentle stroking, and, later, moderate kneading combined with the stroking. The patient should not be lifted out of the bed, its position being changed in the bed instead. A typical case of the disease is easy of recognition within three or four days after the onset of fever. It should be suspected before the paresis or paralysis appears. The presence or absence of pain and hyperesthesia may be of value in determining whether the lesion is closely limited to the spinal cord or higher regions of the neuraxis or whether meningeal implications are shown. The physician should not make the mistake of supposing he is dealing with simple meningitis or neuritis when the fundamental disorder is poliomyelitis. When poliomyelitis is rife in more or less distant communities, one of the most essential things to remember is the frequent existence of abortive and aberrant cases so atypical as to make their nature doubtful. Such cases are as much a source of danger to others as those in which the disease is full-fledged in its manifestations. As a neurologist my attention has been called in a striking manner to mistakes of diagnosis in severe cases of poliomyelitis, especially those showing bulbar, cerebellar or cerebral lesions. I have seen in consultation cases in which the diagnosis of brain tumor or meningitis has been made. I would emphasize, therefore, that during the prevalence of poliomyelitis patients presenting cerebral, bulbar or cerebello-bulbar symptoms should be closely scrutinized with the idea that they may be cases of poliomyelitis of unusual localization. Unless the physician is aware that in the aberrant types the disease may attack practically any part of the brain or cord, he is likely to be misled in diagnosis. Instead of the physician being misled by abortive cases of mild type, exactly the opposite may occur, and he may be confronted with febrile symptoms of the most severe character. In 3 such cases the condition was taken to be cerebrospinal meningitis, tumor or abscess; in 2 instances, typhoid fever of the cerebral type. Bearing in mind, therefore, the abortive form on the one hand, and that of overwhelming severity on the other, the physician will be on guard concerning diagnosis, prognosis and treatment. The disease prevails epidemically in June, July, August and September. Whenever possible, children of an infected community who presumably have not been infected should be removed to locations supposedly immune; and children should not at once be mixed with others who have been brought from a region where the disease had not existed. The manifest precaution is, whenever possible, to take great care in isolating children from a locality in which the disease is epidemic until the period of incubation is over, that is, after two or three weeks have elapsed.

ACUTE POLIOMYELITIS

DR. JAMES H. MCKEE: As Dr. Mills has said, Philadelphia has splendid traditions in the treatment of epidemics. There is little that is characteristic about the onset of poliomyelitis; so very many of the symptoms simulate those of other infections and of some autointoxications. There is nothing very typical about sudden onset with moderate fever usually lasting for several days; nor is there anything very characteristic about the constitutional symptoms, or the fact that the attacks sometimes follow infectious disease. This is particularly true of the polioencephalitis types. Yet we doubt not that the nervous symptomatology is suggestive in the presence of epidemics. It is not usual for babies and very young children to have severe pains in legs, arms, fingers and toes, headache and backache. This is also true of the tenderness, which is often quite general, and the rigidity of the neck. There are relatively few things in early life that cause such symptoms and signs. I need not say that we should seek light from the laboratory, where the results of blood and spinal fluid examinations are of undisputed value. One other symptom that is uncommon in infancy and early childhood and which so often leads to the diagnosis of "rheumatism" is that of profuse sweating. In the differential diagnosis we must consider scurvy, but that is a chronic affection, with slow onset and definite history and is usually afebrile. Tonsillitis in early life may be accompanied by severe pains. In the various conditions to be considered differentially the laboratory comes to our aid. The appearance of the paralysis marks the place at which most of us should leave off with the patient and be prepared to accept a subsidiary rôle, leaving the major part of the treatment to the orthopedists, who know much more about this stage than do we. In the prevention of the disease we must deal with prophylaxis in general. Since the disease occurs particularly during the hot months of the year, we should get the children out of the large cities. The patient should be segregated and much attention paid to the care of all discharges. Animals, although not infected, may be carriers, and should be excluded from the patient. Attendants should wear uniforms and probably rubber gloves. Cleansing of the nasopharynx is essential. The bowels should be opened freely; perhaps nothing is better than the old-time calomel followed by castor oil or salines or hot baths of mustard, with as little disturbance of the patient as possible. Sweating is probably one of Nature's efforts to eliminate the toxins, and we have felt that this should be increased as much as might be. In the presence of meningitis lumbar puncture seems wise to reduce pressure and lessen toxicity. Great emphasis should be laid upon the necessity of absolute rest and quiet for the patient. Protection of the paralyzed parts with cotton, wire frames, etc., needs only to be mentioned. Voluntary activity should be resumed very slowly. Hope for the recovery of the paralyzed part should obtain not only for a year, but for many years.

Dr. Paul A. Lewis: Six years ago in this building, before the College of Physicians of Philadelphia, I gave a summary of what up to that time had been done in the study of poliomyelitis. This summary was given from the results in the laboratory of the work of Dr. Flexner and myself. Two years ago Dr. Flexner made a statement of what he had done with other associates in the meantime. Since then little progress has been made. I can in no way disagree with anything that has been mentioned by Dr. Mills or Dr. McKee. They covered the ground accurately, so far as their statements went. Perhaps you have seen the article by Dr. Flexner in the *Public Ledger* of last Sunday, in which he summarizes his experiences in the matter. While there are some little corrections or notes to be made to that publication, yet, so far as the laboratory work goes, it contains the latest evidence. I shall try to recall briefly my own experience with the work and emphasize some points of our laboratory findings in this and in other infectious diseases with which a community may have to deal from time to time. Poliomyelitis, as all know, is understood to be an infectious disease and, in some greater or less degree, a contagious disease. Its cause is known; to the elect few who have had opportunity to work with the disease in the laboratory its cause may be said to be well known. Reports in current newspapers of the very recent discovery of the cause of poliomyelitis are, of course, out of date. The essential cause was discovered six years ago and became a matter of common knowledge to those who read the results of work in laboratories. Three years ago, with the actual cultivation of the organism by Flexner and Noguchi, the causal organism became more perfectly known. Six years ago inoculations were made from the spinal cord of the human dead of the disease into the monkey's brain and the disease was reproduced in characteristic fashion. From the infected monkey the disease was transferred through others to many hundred, and up to the present time the series has possibly reached hundreds of actual passages. It was found very shortly afterward that the infectious material from the central nervous system of the human could be passed through filters sufficiently small to remove the bacteria and that there would still be a fluid highly infectious. This established the fact that the microörganisms were of well-known bacteriologic status, small enough to be passed through filters and difficult to see under the microscope. Some such may be bacterial in nature and can be cultivated as other bacteria are, and others are probably protozoa, such as the virus of yellow fever, and transmissible only through an intermediate host. The virus of poliomyelitis seems to be of the former class. It has been said that the organism is ultramicroscopic. It can be seen, however. The organism is so small that we cannot, however, tell anything about its structure as is possible with the tubercle bacillus, for example. We know the cause of poliomyelitis chiefly through Flexner and his co-workers, but their experiments have been confirmed and extended by others. Much has been said about the methods of transmission. I believe the studies have indicated to a certainty that transmission is by contact. On the other hand, there may be other methods of transmission. There are certain bizarre facts in connection with the disease not easily explained on the basis of direct contact. However, we cannot go astray in taking this assumption of contact as the starting point of combating any epidemic that may arise. There is often difficulty in guarding against contact, because many cases are abortive to the extent that the individual shows no signs which lead the family to call the physician and no sign which would lead the physician to be positive in his opinion whether the patient had been suffering from any infection, to say nothing about poliomyelitis. For a certain number of paralytic cases there are a number not paralytic, and these are just as dangerous to the uninfected as are the paralytic cases.

Upon these practical matters I feel the fullest assurance that your Board of Health is fully equipped and has a spirit entirely adequate to deal with the matter when the time comes. Such a time in this city we hope may be far from us. We must recognize that the time may come when it will be necessary to exercise the utmost patience with what the Health Department may deem essential in the effort to combat such an epidemic. By the examination of the spinal fluid tuberculosis and meningitis can be excluded if the tubercle bacillus is found. The study of the epidemiology of the disease under certain conditions the laboratory can greatly help. The laboratory, however, has done its best work in showing that individuals in contact with the infected are frequently carriers of the disease. The laboratory has confirmed the clinical observation that there is a mild abortive or subparalytic form of the disease. Furthermore, the presence of the virus in the nasal secretions has been demonstrated. There is no doubt that healthy adults may carry the virus if they are in contact with the infected individual. I want to emphasize the fact that we are on the right track so far as the laboratory can show in any prophylactic measures which the Department of Health may think necessary based upon the supposition of the contagiousness of the disease. The laboratory has produced nothing of practical importance in the therapeutic control of the disease, beyond the fact that certain experiments by Flexner and his co-workers show that the serum of immunized animals and some chemicals could, under certain conditions, mitigate the disease in monkeys. On the other hand, the fact that these workers have not shared their work with the public is sufficient evidence that they have not a cure for poliomyelitis. Anything the newspapers may say to the contrary should not excite anybody. In considering our ability as a city to cope with this disease, we find that we have a good Health Department and a well educated medical public. That which we have not got, but which could be used to great advantage, is an available sum of money to be devoted to the study of infectious diseases.

ORTHOPEDIC TREATMENT OF INFANTILE PARALYSIS

DR. J. TORRANCE RUGH: The treatment of the ravages of infantile paralysis devolves ultimately upon the orthopedic surgeon. There are, however, many things which the general practitioner should know regarding the care of these patients during and following the attack. The great essential in the after treatment of these cases is absolute rest. You will be importuned by the family to allow the patient to sit up, or to move the affected leg or arm. Don't let it be moved; keep that part still, at absolute rest! The treatment as advocated by Oppenheim and elaborated by Lange of fixation in plaster of Paris to secure rest, essential for restoration of function and the carrying away of the products of the inflammation, has given by far the best results in these cases. The great trouble, however, is the difficulty in securing the co-operation of the family in allowing such fixation. Any treatment, so far as our experience goes, which is directed to the nerve centers themselves has met with utter failure. Certain electro-therapeutists claim ability to restore to a very much greater degree the nerve function of these nerve centers than can be accomplished by any other means. But here enters the great problem to which Dr. Mills has already called attention—that in all grades of infection from the abortive to the fulminating, no man living knows how far recovery of paralysis will take place without any aid whatsoever. Some of these cases which have been totally paralyzed recover with apparently no evidence of the disease. Therefore, to ascribe to any one method of treatment, curative effects, so far as the nerve centers are concerned, is entirely out of the question. Our efforts must be directed chiefly to the care of the paralyzed parts. There is a too great tendency to begin the use of massage and electricity too early. These muscles must be put at complete rest until all evidence of the acute condition has subsided. Then the tonic treatment by massage, electricity, or whatever means are employed, should be begun in the endeavor to maintain the tone of the muscles and the life of the muscle fibers. The muscles are kept at rest to guard against any strain which tends to increase degeneration of the fibers. There must be also the prevention of faulty postures. As a result of the acute inflammation in the structures faulty postures begin extremely early, even before they show themselves to the eye or the finger of the examining surgeon. If the paralysis affects the trunk muscles, the child should not be allowed to sit up. If the paralysis affects the legs, the patient should not be allowed to walk, as there is nothing to maintain the weight of the body except the ligaments and they are insufficient, unless supported by the muscles. Therefore, when the muscles are paralyzed the earliest thing to do is to keep the parts absolutely at rest; keep them from assuming a deformed position and guard them against strain. When the child begins to walk the extremities should be maintained in their proper position. It is surprising in many instances the great amount of power which will return after four or five years when these muscles which have been subjected to constant strain have been protected and the parts maintained in proper position. If there is any tendency to deviation from the normal position a brace should be applied to the part. The indications for the application of braces are definite, whatever condition may be present, and no brace should be applied except to accomplish certain absolute needs. The therapeutics of a brace are as accurate as those of a drug. Another measure of value to be employed early is that of having the patient practice voluntary movement of those muscles which have not been totally paralyzed. By giving the child voluntary control over a group of weakened muscles the opposing muscles will be prevented from drawing the part into a deformed position, and when the child walks he will be able to maintain the correct position. In those cases in which there is total loss of power, operation offers a great deal in treatment. This, however, brings in a portion of the work which belongs to the specialist, and any man who attempts work of this kind unless he is trained to it will meet with absolute defeat in the treatment of these cases. The surgical treatment of infantile paralysis is divided into the two great classes of destructive and constructive surgery. Constructive surgery is indicated after two years have elapsed since the attack of the paralysis, and consists chiefly in the transposition of tendons, silk inserts and similar measures. Destructive surgery, which aims at securing stability at the expense of certain structures or functions, should not be employed until six years have passed, and in the selection of operations those which utilize structures already existing are to be preferred to those which make use of foreign substances for various purposes.

Dr. Wilmer Krusen, Director of Public Health and Charities, Philadelphia: Of the 2 cases of reported infantile paralysis now in the Municipal Hospital, one is a case of true infantile paralysis, the other a case of infantile paralysis, but not of the poliomyelitic type. We have found that the child's paralysis is due to a cerebral abscess following middle ear disease. We have, therefore, only 1 case of true infantile paralysis. You can readily understand that with such a severe epidemic in New York and Brooklyn our work in connection with the Department of Health has been most aggressive. While we believe in preparation for a possible epidemic, we do not believe it wise to frighten either the public or the profession. We have wards available in the Municipal Hospital to take care of at least 100 cases. If necessary it will be possible to have other general hospitals set aside certain space. I want to take this opportunity to thank the pediatrists, neurologists and orthopedists, and all others who have given of their time and service in the last few weeks in assistance to the Department of Health. We have been trying to educate the family to send for the physician promptly when illness occurs among the children. We shall pursue in poliomyelitis the same stringent measures observed in cases of smallpox.

Dr. John F. Sinclair, President, Philadelphia Pediatric Society: I am glad that for the present the misfortune of an epidemic of infantile paralysis has not come to us. It seems imperative, however, that we should be alive to the questions connected with this disease and be prepared to meet it if we must. Personally, I want to thank those who have been so ready to cooperate, the many who have shown their interest in the subject by the large attendance at this meeting, the College of Physicians for giving us the use of this room, as well as the essayists of the evening.

Dr. D. Braden Kyle laid emphasis upon the responsibility of the upper respiratory tract for the infection and spoke upon prophylaxis and treatment from this standpoint.

Dr. Charles K. Mills: We are not yet aware of the manner in which poliomyelitis is transferred from one geographical locality to another; we see it appearing in widely different sections with great intermediary regions free of the disease. In the migration of the contagion I think not enough attention has been paid to the part played by animals and to the birds of the air. The possibilities in this connection offer fascinating subjects for study.

MISCELLANY

INFORMATION FOR PHYSICIANS REGARDING POLIOMYELITIS (INFANTILE PARALYSIS)

(*Issued by the New York City Department of Health in its Weekly Bulletin for July 15, 1916, and Distributed to All the Physicians in Greater New York*)

Early Diagnosis—The attention of physicians is called to the necessity of an early diagnosis of all cases of poliomyelitis.

Reporting of Cases—*All suspicious cases must be reported to the Department of Health by telephone,* to be followed within twenty-four hours by a written report. The ability of the Department of Health to limit the spread of the infection depends upon the immediate reporting of every suspicious case.

Age of Persons Affected—It should be remembered that this disease may occur at all ages, although the great majority of the cases are found in children between the ages of one and five years.

Type of Disease—Peabody, Draper and Dochez, of the Rockefeller Institute, give the following classification of the disease:

(1) The abortive cases, which do not become paralyzed.
(2) The cerebral group, with spastic paralysis.
(3) The bulbo-spinal group.

Abortive cases are very frequent. The children have the early symptoms just mentioned, perhaps also the muscular tenderness and spinal pain. If carefully observed it may be noticed that they develop a paralysis of one or more groups of muscles, but that instead of the paralysis continuing it all disappears within a few hours. Many of these cases develop no paralysis whatever. It is obvious that the recognition of such cases is of extreme importance in controlling the spread of the disease. The diagnosis of such is greatly facilitated by an examination of cerebrospinal fluid obtained through lumbar puncture.

Methods of Infection—The experiments of Landsteiner and Popper in Germany, Kling, Petersson and Wernstedt in

Sweden and of Flexner and Noguchi in this country, have proved that the disease is transmitted from the secretions of the nose and mouth, and the bowel discharges of an infected person. The infection is transmitted through the mouth, tonsils and nasal mucous membrane.

SECONDARY CASES—Secondary cases in the same family are comparatively rare, but occur often enough to warrant insistence upon preventive measures.

CONTACTS AND CARRIERS—It must be remembered that while the transmission of the *disease* from a patient to other members of the same family is rare, transmission of the *virus* is common. Experience regarding the occurrence of poliomyelitis warrants the assumption that the disease is spread by contacts and carriers who may be children or adults, who are themselves immune but who harbor the infective material in their nasal or mouth secretions.

SYMPTOMS—Early symptoms to be regarded as suspicious are: Fever, vomiting, slight diarrhea, listlessness, unusual fretfulness and drowsiness. Later, and more characteristic symptoms, are: The appearance of weakness in any extremity, skin and muscular sensitiveness, spinal pain, especially on flexion, apparent or real rigidity of the neck muscles, Kernig's and MacEwen's signs.

COURSE AND DURATION OF DISEASE—Paralysis appears usually before the sixth day of the illness; it may occur as early as the first day. Other symptoms, except spinal and muscular pain and rigidity and skin sensitiveness, rarely exist.

ABORTIVE CASES—Abortive cases are very frequent. In some epidemics they constitute from 25 to 50 per cent. of the diagnosed cases. The children have the early symptoms just mentioned, perhaps also the muscular tenderness and spinal pain. If carefully observed it is noticed that they develop a paralysis of one or more groups of muscles, but that instead of the paralysis continuing it all disappears within a few hours. It is obvious that the recognition of such cases is of extreme importance in controlling the spread of the disease. The diagnosis of such cases is greatly facilitated by an examination of cerebrospinal fluid obtained through lumbar puncture.

General Care of Patient—Complete rest is of the utmost importance for either paralyzed or weak muscles for the first five or six weeks. Every effort must be taken to make this rest complete. The limb must not be allowed to drag on a paralyzed muscle. It should be supported by pillows or pads or bandages. There seems to be a greater tendency to atrophy if casts are used. A dropped foot may be supported by a sandbag or pillow; small rolls placed under the knee often hold the leg in a more comfortable position. The weight of the clothing should be kept off the legs by hoops or other device. If the head is somewhat retracted and the patient desires to lie on his back, he may sometimes be made more comfortable by a small pillow placed under the shoulders, allowing the head to fall back. The value of electricity for treatment in the first six weeks is very doubtful. In many instances it may do harm. Massage or passive movements should not be begun for at least five or six weeks and then should be used with great care. In cases that show a tendency to clear up rapidly, the child should be kept in bed for some time after the ability to use the muscles returns. It should never be encouraged to try to stand or to use the muscles otherwise until a considerable time has passed.

Period of Incubation and Duration of Disease—Non-immune, infected persons usually manifest symptoms of the disease in from five to ten days after exposure. The average period of incubation is seven days. The early symptoms, noted above, usually last from one to seven days. Quarantine should be maintained for a period of at least eight weeks.

Prevention of Spread of Infection—(1) The children from an infected house should be allowed out of doors, but should be kept by themselves and away from large groups of other children. In one and two-family houses it is advisable not to allow the children from an infected family outside of the yard for several weeks after onset of the case.

(2) During the continuance of an epidemic of poliomyelitis children should not be allowed to congregate in public places.

(3) Fresh air outings or vacation camps are allowed, if kept under competent medical supervision, with an adequate physical examination of each child before enrollment and the exclusion of any child from an infected family.

(4) Absolute cleanliness of all homes is essential; such cleanliness should include: (*a*) screens in all windows; (*b*) flies kept out of all rooms; (*c*) thorough cleanliness of all floors, woodwork, bedding and clothing; (*d*) avoidance of dust (all sweeping should be done after the floors have been sprinkled with sawdust, bits of newspaper or tea leaves, all thoroughly moistened); (*e*) garbage cans kept covered and washed out in hot soapsuds after they have been emptied; (*f*) no refuse, either of food or other waste, allowed to accumulate.

(5) Personal habits of cleanliness are essential; the hands should be washed before each meal, after each visit to the toilet, and before going to bed. Children should be warned about putting the fingers into the mouth or nostrils.

(6) When sneezing or coughing, a handkerchief should be held over the mouth. Kissing of children is also a dangerous practice and should be avoided.

PROCEDURE TO BE FOLLOWED IN EACH CASE

Isolation of Patient—(1) Complete isolation of the patient must be maintained until terminated by order of the Department of Health.

(2) A separate room must be provided for the patient. No one must be allowed in this room except the attending physician, the nurse and the representative of the Department of Health.

Care of Patient's Room and Surroundings—(3) (*a*) All rugs, carpets, draperies and unnecessary furniture must be removed before the patient is placed in the room. (*b*) All windows must be screened or a mosquito netting placed over the bed so as to protect the patient from flies or other flying insects. (*c*) The sick room must be kept well aired at all times. (*d*) The woodwork must be wiped daily with damp cloths. Under no circumstances must the floor be swept when it is dry. It should be sprinkled with sawdust, bits of newspaper or tea leaves, all thoroughly moistened and then carefully swept so that no dust may arise. (*e*) Toys and books used by the patient must be destroyed by burning after recovery or death. (*f*) Household pets must not be allowed in the room.

Care of Bedding—(4) All cloths, bed linen and personal clothing which have come into contact in any way with the patient must immediately be immersed in a 5 per cent. solution of carbolic acid and allowed to soak for three hours. They may then be removed from the room and must be boiled in water or soapsuds for fifteen minutes.

CARE OF DISCHARGES FROM BODY—(5) A sufficient supply of gauze or clean linen or cotton cloth must be provided and all discharges from the nose and mouth of the patient received on these cloths. After use, they must be immediately burned.

Bowel discharges and urine must be covered at once with chloride of lime and then disposed of by emptying into a water closet.

CARE OF UTENSILS USED BY PATIENT—(6) Plates, cups, glasses, knives, forks, spoons and other utensils used by the patient must be kept for his exclusive use and under no circumstances removed from the room or mixed with similar utensils used by others. They must be washed in the room in hot soapsuds and then rinsed in boiling water. After use, the soapsuds and water must be thrown into the water closet.

NURSE—(7) A trained nurse or competent attendant must be in sole attendance upon the patient. She must not be allowed to mingle with the rest of the family but must be isolated with the patient. The hands of the nurse must be carefully washed in hot soapsuds after each contact with the patient and before eating.

TERMINATION OF CASE—(8) After the case has been ordered terminated by the Department of Health, the following procedure must be followed: (*a*) The entire body of the patient must be bathed and the hair washed with hot soapsuds. The patient should then be dressed in clean clothes (which have not been in the sick room during the illness) and removed from the room. (*b*) The nurse should also take a bath, wash her hair, and put on clean clothes before mingling with the family or other people.

ACTION TAKEN BY THE DEPARTMENT OF HEALTH IN EACH CASE

PLACARDING—Every case of poliomyelitis reported to the Department of Health will be visited promptly by a physician of the Department of Health. If the case is actually one of poliomyelitis, the premises will be placarded and a quarantine will be established lasting for eight weeks, or, in case the patient dies or is removed to a hospital, until after renovation and cleansing of the apartment.

Removal to Hospital—The Department of Health will insist on removing patients ill with poliomyelitis to one of its hospitals unless isolation and care of the patient are equivalent to that afforded by the best hospitals. This means a separate room for the patient, and a trained nurse or other competent attendant who does not mingle with the other members of the family. The question of removal to hospital will be decided by the inspector visiting the case.

Deaths—In case of death prompt burial is required, the body to be sealed as in deaths from other contagious diseases, and the funeral will be strictly private. Church funerals are prohibited.

The Production of Icterus in the Newborn—Gessner (Gynäk. Rundschau, Vol. IX., No. 13-14) distinguishes an idiopathic rather than a physiologic form of this condition and also a symptomatic or septic variety. He believes that the latter is frequently due to the absorption from toxins produced by an acute otitis, which may be observed locally, or finding their way through the Eustachian tube may reach the stomach. Autopsy examinations by a number of investigators have shown that about two-thirds of all fetuses, either stillborn or dying soon after, present a puerperal infection of the middle ear. A portion of the liquor amnii may have reached the middle ear during intrauterine life and subsequently become invaded by pathogenic microörganisms through the Eustachian tube. Systematic examinations of the middle ear in the newborn during the first ten days of life have not been made, but during a later period it has been shown that about 75 per cent. of the children in various clinics present a completely unabsorbed otitis media. Gessner believes that it is scarcely possible to avoid an otitis neonatorum, but that other paths of paraportal infection may be reduced. Thus the cord should be tied off close to its junction with the skin in order to avoid absorption from the part which will undergo necrosis. Moreover, this surface may be painted with formalin or tincture of iodin. The resulting granulation is consequently much smaller and the period of healing greatly reduced.—*The American Journal of Obstetrics.*

DEPARTMENT OF ABSTRACTS

ORIGINAL CONDENSATIONS OF CURRENT PEDIATRIC LITERATURE BY THE EDITORS AND THE FOLLOWING ASSOCIATES

Charles E. Farr.......New York City
Morris Friedson........New York City
Gaylord W. Graves.....New York City
Howard K. Hill......Philadelphia, Pa.
Jerome S. Leopold.....New York City
William Lyon..........Jackson, Mich.
John B. Manning..Seattle, Washington
Stafford McLean.......New York City
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Mark S. Reuben.......New York City
Mills Sturtevant.......New York City
Samuel W. Thurber....New York City
Eugene F. Warner.....St. Paul, Minn.
Edwin T. Wyman.......Boston, Mass.
J. Herbert Young.......Newton, Mass.

RYERSON, E. W.: METHODS OF STABILIZING THE FLAIL FOOT IN INFANTILE PARALYSIS. (American Journal of Orthopedic Surgery, July, 1916, p. 387.)

Many of the operative procedures in the treatment of paralytic conditions have become standardized in the last few years. The question still remains of treating the very weak and flail-like feet where nearly all the muscles are paralyzed. The problem would be simplified if a harmless chemical or bacterial injection could be found which could produce a fibrinous or bony ankylosis.

The author has found the silk cord suspension in which cords of silk are passed from the bones of the legs to the bones of the foot to have many objections. In many cases the cords have acted as foreign bodies and have had to be removed. In several cases the foot gradually returned to its former equinus position, or the cords became uprooted. Although the foot drop was corrected by this method, varus and valgus deformities recurred in many cases.

The autogenous bone peg or dowel driven down through the lower end of the tibia and through the astragalus and os calcis at first immobilized, but at the end of about twelve months the graft absorbed and the ankle was found to be as freely movable as before.

In 3 cases a broad strip of periosteum was turned down from the tibia and fibula and sewed to the denuded surface of the astragalus and calcaneum. These cases were failures.

Gallie's method was employed in 40 cases with satisfactory results in many cases. In addition to inlaying the tendon in the groove gouged in the bone, the author has drilled a hole through the bone at the upper end of the groove. The proximal portion of the tendon is dissected up, cut off as high as possible, passed through the hole and brought down in loop fashion, to be sewed side by side to the portion lying in the groove. With the peronei thus anchored, the peroneus longus is placed forward in front of the malleolus, placed in the artificial groove, passed through the hole bored in the fibula, turned downward in the peroneal sheath and sutured to the peroneus brevis.

It is best adapted to those feet that show little deformity. In calcaneo-valgus the astragalectomy of Whitman has given good success. The only practical objection to the removal of the astragalus is that there is a certain amount of shortening. The writer advises more frequent resort to astragalectomy in weak feet and, in addition, fixation of the tendons as modified from Gallie's operation. C. E. F.

DAVIS, G. D.: STABILITY OF THE LOWER EXTREMITIES IN PARALYTICS. (American Journal of Orthopedic Surgery, July, 1916, p. 391.)

In paralysis of the lower extremity the attainment of stability is the primary object. Associated with stability is the question of balance, which is largely controlled by the muscles.

In poliomyelitic cases the grade of disability increases from the foot to the trunk. If the foot is involved it assumes the position of varus or of valgus if the joint beneath the astragalus is affected. If the ankle joint is affected the condition of calcaneus or of equinus results.

If the sub-astragalus joint is the only involved part, the disability is often not marked. In this case arthrodesis, fixation of the tendon, transplantation of the tendon, or silk ligaments can be used to stabilize the joint. If the condition is uncomplicated by paralysis of the parts higher up, the necessity of its correction is not always urgent.

With instability of the knee the problem is more complicated. The author shows by analyzing the weight pressure upon the knee that if a stable lower extremity is desired the knee and the hip joint should be in the hyper-extended position.

When the pelvis is tilted up on the affected side the knee may be placed in hyper-extension by transplanting into the patella the lower end of the sartorius, biceps, semitendinosus, or semi-membranosus. Another means of securing a stable back knee is by the fixation of the ankle joint; by this means the body weight is thrown on the toes, the heel descends and the knee is forced backward. Cases with slightly flexed knees are often accompanied by knock-knee. In these cases osteotomy of the lower end of the femur is the desirable procedure.

When the muscles controlling the hip and running from the trunk, especially the gluteus maximus, are paralyzed, the difficulties are greatly increased. If the gluteus maximus is active, even if the quadriceps femoris is paralyzed, the gluteus will pull the femur back and frequently fix the knee.

If extreme external rotation is present the writer advises sewing the fascia lata firmly to the posterior edge of the greater trochanter, while the foot is held in internal rotation.

To stabilize the spine, the writer advises the insertion of a bone graft into the lower spine and into the dorsal region.

C. E. F.

TAYLOR, R. TUNSTALL: OPERATIVE TREATMENT OF INFANTILE PARALYSIS. (American Journal of Orthopedic Surgery, July, 1916, p. 394.)

The cases are divided by the author into three groups: (1) Those whose deformities are due to overactivity of certain groups of muscles with paralysis of the antagonistic group and in which the deformity may be corrected to an appreciable functional degree. (2) Those whose deformity is due to a post-paralytic contracture of certain muscles without demonstrable power of contractibility and whose deformity may be corrected without hope of functional restoration. (3) The flail extremities without deformity and with total absence of power which must be supplied by some brace or by osteoplastic procedure.

The writer believes that tenotomy and myotomy are justifiable if a tendon transplantation or transference cannot be done.

Tendon shortening should only be done by cutting off the peripheral end, then anchoring into the periosteal or bone groove. Tendon lengthening by oblique section and suturing has no advantage over tenotomy. Tenodesis is only justifiable when the parent muscle has degenerated. Extra-articular and intra-articular silk ligaments are chiefly indicated in flail joints, where impotent tendons are not to be had for tenodesis. They are inadequate during growth.

Arthrodesis is not to be recommended except for flail ankle joints in adolescents and in adults. The author believes that articular transposition for calcaneus, as advocated by Gwilym Davis, is valuable when accompanied by appropriate tendon transplantation into the heel.

Astragalectomy for calcaneous is not justifiable until other procedures fail.

The author believes that in partially paralyzed cases tendon transplantation is of the greatest value. Adhesions are avoided by carrying the transplanted tendon through adipose tissues, through sheaths of tendons, or through septa made by plastic flaps and by early electric stimulation.

The author believes the time for allowing weight-bearing depends on the severity of the original deformity, strength of the transplanted tendon and the security of the mechanical fixation by sutures. C. E. F.

WALLACE, CHARLTON: OPERATIVE TREATMENT FOR DISABILITIES AND DEFORMITIES FOLLOWING ANTERIOR POLIOMYELITIS. (American Journal of Orthopedic Surgery, July, 1916, p. 400.)

The operations for the disabilities and deformities following anterior poliomyelitis at the Hospital for the Ruptured and Crippled for the past three years have been divided by the writer into eleven groups. The average age of the patients at the time of the attack was two years and one month and lapse of time between the onset and the operation was five years and nine months.

In group one the operations were for the preparation for putting on the splints or were open operations. Of the total number of these operations, 210 in all, 196 were successful. By successful is meant the best possible result obtainable.

In comparing the tenotomies of the tensor fasciæ femoris with the Souter operation for flexion deformities at the hip, the author found the later more efficient.

In the group of miscellaneous operations for paralytic foot deformities, 4 were successful from a total of 10.

Four successes are recorded from a total of 4, in operations for equino-varus. For equino-valgus the statistics show 4 out of 6; for valgus deformities, 4 out of 7; in the transplantation of the tibialis anticus transversus to the external border of the foot; in transplanting it to the cuboid and the peroneals grooved to fibula, 3 out of 3 were reported successful.

In this group there were a total of 28 successes from a total of 46 reported.

In the next group, attempt to secure ankylosis of the hip in children was almost useless when arthrodesis was used.

In paralysis of the quadriceps extensor muscle with both hamstrings present and active, the substitution of the one or the other for the paralyzed muscle has given satisfactory results. All of the transplantation of the semi-membranosis in 11 cases held firmly. In the fourth group, from 29 arthrodeses peri-astragalus, 13 held well, 6 were improved, 10 showed no ankylosis.

In the next group the grooving of the paralyzed anterior tibial tendon into the front surface of the tibia and combined with the transplantation of a strong extensor proprius hallucis tendon through the calcaneo-scaphoid ligament, looped back and sutured to itself has proven satisfactory.

In the next group, where astragalectomies have been performed and the peroneal tendons have been utilized by Gallie's method good feet have been obtained. This was especially so for varus or equino-varus deformity when the foot had been displaced backward.

The writer found the Whitman operation successful in 97 of 116 cases when performed for calcaneo-valgus, calcaneus and dangle foot. In 12 cases, after a Whitman astragalectomy, the foot assumed an undesirable position and was successfully corrected in 10 cases.

In the total of all the groups of 666 operations the statistics show 540 to have been a success.

The author concludes that nearly one-third of the operations tabulated would have been unnecessary if the patients had received proper brace attention. He thinks that the Souter operation for contracture about the hip and the transplantation of an active hamstring tendon to the attachment of the paralyzed quadriceps extensor have been highly successful. Arthrodesis operations in children have been of little value in paralytic deformities. The grooving of the tibialis anticus tendon into the anterior surface of the tibia and the transplanting of the extensor hallucis tendon to the calcaneo-scaphoid ligament for equino-valgus deformity has been most helpful. The writer feels that the most satisfactory operation for calcaneus, calcaneo-valgus and dangle foot deformity has been the typical Whitman operation. C. E. F.

SOME BOOKS ON POLIOMYELITIS

1. Die Epidemische Kinderlähmung. By Dr. Paul H. Römer, of Marburg. Berlin: Julius Springer, 1911.
2. Investigations on Epidemic Infantile Paralysis. Report from the State Medical Institute of Sweden. English Translation by Alfred V. Rosen, M.D. Stockholm: The State Medical Institute, 1912.
3. A Clinical Study of Acute Poliomyelitis. By Francis W. Peabody, M.D., George Draper, M.D., and A. R. Dochez, M.D. New York: The Rockefeller Institute for Medical Research, 1912. (Monograph No. 4.)
4. Acute Poliomyelitis. By Dr. Ivan Wickman, of Stockholm. Authorized translation by W. J. M. A. Maloney, M.D. New York: The Journal of Nervous and Mental Disease Publishing Company, 1913.
5. A Manual of Infantile Paralysis. By Henry W. Frauenthal, M.D., and Jacolyn V. V. Manning, M.D. Philadelphia: F. A. Davis Company, 1914.

It is impossible in the space available to give a complete review of the contents of these excellent treatises. They do not comprise the whole of the books available on poliomyelitis, but they are all valuable additions to one's working library and state the problem of this disease completely. Perhaps the most exhaustive scientific work is to be found in the pages of Römer, and Wickman, and in the Rockefeller monograph, which has already been reviewed in a previous volume of the Archives. The Swedish report originally prepared for the Congress on Hygiene and Demography is replete with valuable facts and figures. Dr. Frauenthal's book is of value chiefly, perhaps, because of the description of the author's methods of treatment, which have been followed by remarkable cures, and because of his wide clinical experience with the orthopedic care of these cases. Supplementing these books by the publications of Flexner, Lewis and Lovett, one will be able to acquire an up-to-date knowledge of poliomyelitis which will serve him in good stead.

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ARCHIVES OF PEDIATRICS

SEPTEMBER, 1916

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ORIGINAL COMMUNICATIONS

MENINGOCOCCUS MENINGITIS WITH UNUSUAL HEMORRHAGIC MANIFESTATIONS AND DEMONSTRATION OF THE DIPLOCOCCUS IN THE SKIN*

BY C. T. SHARPE, A.B., M.D.

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Clinic, Columbia University

Four cases of cerebrospinal meningitis were reported in this city for the week ending March 18, 1916. One of these cases, under the designation of measles and purpura, found its way into the Willard Parker Hospital at midnight of March 13th. Needless to say, the admitting physician did not accept it as a case of measles and it was promptly isolated, as it presented very unusual objective symptoms.

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* Read at the New York Academy of Medicine, Section on Pediatrics, April 13, 1916.

The patient was a little Hebrew girl three and a half years old, well developed and well nourished. The history obtained stated that the child had been ill six days with measles and the rash disappeared on March 11th.

PHYSICAL EXAMINATION—Child is apathetic, eyes closed, moves head from side to side, and has a marked tremor which is more or less constant. She can be roused sufficiently to take a drink, but appears in a subconscious state and has a dry, troublesome cough.

The most notable feature is the widespread *purpura* with a remarkable vermilion border in the larger areas. In size the purpuric areas vary from small petechiæ to suffusions four to four and a half inches in size. One area involves the left ear, left cheek, the nose, upper and lower lips, the chin, the right cheek to an extent of about two inches from the right angle of the mouth and spreads up to the forehead over the glabella. On the forehead are petechiæ. Both eyes show subconjunctival hemorrhage and the lids are also involved. Over the scalp there is little sign of hemorrhage, but there are two areas one to one and a half inches by one-half inch on the back of the neck within the hair line.

The mouth shows petechiæ on buccal mucous membrane, hard palate and tongue. The gums over central upper and lower incisors and adjacent areas are black, but there is no free bleeding.

Over the trunk and extremities the same gradations in the purpuric areas exist, as noted above. The left arm is involved to a much greater extent than the right and the discoloration extends from the shoulder to the wrist. There are small hemorrhages in the palms. The suffusions are more marked on the right leg than the left and involve the knee and ankle. Both buttocks are involved to a considerable extent. The vulva is not involved and the mucous membrane here is normal in color.

Examination of the heart, lungs and abdominal organs reveals nothing abnormal. The stools are normal in consistency and color. The urine is clear, amber, acid, specific gravity 1,008. There is a moderate amount of albumin and there are hyalin casts with a few white blood cells.

NERVOUS SYSTEM—The eyes are normal on inspection and react to light. The patella tendon and triceps reactions are reduced. Other reflexes are negative. There is but little response to stimuli either in testing reflexes or sensation. There is more or less tremor when disturbed.

BLOOD EXAMINATION—The blood was examined by Dr. Hess and his report is as follows: *Capillary resistance* was greatly diminished and the application of the bandage increased the purpuric areas in the arm. *Bleeding time prolonged. Platelets,* 216,000; *leukocytes,* 34,000; *coagulation time,* fourteen minutes (slightly above normal); *plasma,* slightly hemolysed.

Later in the day moderate rigidity of the neck was noted and Kernig's and Brudzinski's tests were possibly present. A lumbar puncture was done and 15 c.c. of a slightly turbid fluid withdrawn. There was no evident increase in pressure. The fluid was sent to the meningitis department of the Research Laboratory for examination. Two other punctures were done on succeeding days. The reports on these fluids showed from 95 to 98 per cent. polymorphonuclear leukocytes, moderate increase in cells. The first two samples were not distinctly purulent. The bacteriologic examinations showed an increasing amount of extra cellular gram negative diplococci, and the cultures gave pure growths of the meningococcus. The reaction was neutral. Albumin was present in increasing amounts at each examination, and the globulin increased from two plus to three and four plus. It should be noted that the Fehling's reaction gave a reduction in all three samples, but in decreasing amounts.

BLOOD CULTURES—A blood culture was done on the 14th, and on the next day a gram negative diplococcus was found. Glucose acetic agar tubes and plates were successfully inoculated. These were given to the Research Laboratory for absolute identification of the suspected meningococcus, and the cultural reactions were found to be characteristic.

LATER PHYSICAL EXAMINATION—On the 15th a physical examination showed a few scattered moist crepitant râles at the left base posteriorly. The right ear was normal, the left showed some congestion of Shrapnell's membrane; short process and handle of malleus distinct; membrana tensa normal. The patient was still in a semiconscious condition. The left leg and arm were rigid. The respirations were very rapid at times and then returned to normal or subnormal. The skin over the purpuric area on the back of the scalp broke down and there was some slight bleeding. One black, tarry stool was recorded.

TREATMENT—Two intraspinous and two subcutaneous injections of antimeningitis serum were given.

At 10:25 on March 16th the child died and immediately thereafter three sections of skin one-quarter of an inch in diameter were removed from the vermilion border of the purpuric lesions and hardened in 70 per cent. alcohol.

AUTOPSY—An autopsy was done by Dr. Alexander Fraser, of Bellevue College, who reports as follows:

"Pathologist, Dr. Alexander Fraser. Name, N. S. Age, three and one-half years.

"ANATOMICAL DIAGNOSIS

"*Nervous System*—Acute cerebrospinal meningitis.

"*Vascular System*—Moderate granular degeneration of heart; degeneration and in many places necrosis of terminal vessel walls with early thrombosis.

"*Respiratory System*—Acute exudative bronchiolitis; hypostatic congestion of lungs with small foci of exudative pneumonia.

"*Spleen*—Acute congestion.

"*Liver*—Congestion, edema and moderate granular degeneration.

"*Kidneys*—Acute granular degeneration.

"EXTERNAL INSPECTION

"White, female, age three and one-half years. Body fairly well developed and fairly well nourished. Slight rigor mortis. Eyes, aural, nasal and buccal cavities apparently negative. Skin shows large ecchymotic patches involving greater part of face, left arm, buttocks, right knee and ankle. Smaller subcutaneous hemorrhages are sprinkled thickly over whole body.

"INTERNAL INSPECTION

"*Head*—Skull and dura negative. The arachnoid is, for the most part, smooth and transparent. In the subarachnoid space are small "hazy" to "milky" areas around the vessels, especially over the superior surfaces of the parietal lobes and the posterior surface of medulla and cervical cord. On the superior surface of the central lobule of the cerebellum is a very thick, whitish spot about the size of a pea. The base of the brain and cranial nerves are apparently negative. The pial vessels are markedly congested. The lateral ventricles are free from fluid; ependyma negative; cortex of brain and basal ganglia apparently negative.

"THORAX

"*Heart*—Myocardium pale, "cooked" looking and friable; otherwise negative.

"*Lungs*—Both lower lobes markedly congested and possibly hemorrhagic. Sections do not sink deeply in water. Both upper lobes emphysematous. Pleural cavities dry; few adhesions in posterior lower portion of right.

"ABDOMEN

"*Peritoneal Cavity*—No fluid. Serosa smooth and glistening. One ecchymotic spot about the size of a dime on intestinal wall.

"*Liver*—Size normal. Surface mottled, dark purple and pale brown. Parenchyma granular and friable.

"*Spleen*—Slightly enlarged and dark purple in color. Cut surface of deep-red color peppered with numerous white dots (splenic nodules). Parenchyma firm in consistency.

"*Kidneys*—Both are swollen and grayish in color. On section the parenchyma bulges and the edges become everted. Capsule strips easily. Cortex is swollen and grayish; markings obscured.

"*Other Organs*—Negative.

"MICROSCOPIC EXAMINATION

"*Meninges*—Sections from the area in cerebellum noted above show the subarachnoid space and pia infiltrated with a moderate number of polymorphonuclear leukocytes, large endothelial leukocytes and plasma cells, with a few lymphocytes and red cells. The endothelial leukocytes and plasma cells are particularly abundant around the blood vessels, large numbers of them being closely packed in the perivascular lymph spaces. They frequently contain in their cytoplasm several polynuclear leukocytes and sometimes lymphocytes and red cells. Occasionally a vessel is seen distended with a mass of closely-packed polymorphonuclear leukocytes, giving the appearance of a leukocytic embolus. Many of the vessel walls show various degrees of necrosis of the endothelial and sometimes of the deeper layers. Serum is present, but no fibrin can be detected. The vessels of the choroid plexus show perivascular infiltration of similar cells. One of the larger vessels contains a large mass of red cells enmeshed in distinct fibrin threads. The epithelial covering of the plexus is, for the most part, well preserved, but occasional groups of cells stain poorly. The underlying cortex is unchanged.

"*Lungs*—Sections from the lower lobes show diffuse congestion with a few small foci of cellular exudate similar to that present in the meninges. In these foci the bronchioles are filled and their walls infiltrated with similar cells.

"*Heart, Kidneys and Liver*—Show granular degeneration."

THE HISTOPATHOLOGY OF THE SKIN SECTIONS

THE EPIDERMIS

The Stratum Corneum—Groups of red blood cells are seen between the meshes of the corneum and upon the outermost layer. In one area there is an accumulation of cells and fibrin and keratinized cells between the stratum corneum and stratum lucidum.

Stratum Lucidum—Normal.

Stratum Granulosum—Normal in thickness with some edema within the cells and occasionally vacuolization of the cells.

Stratum Malpighii—Here there is marked edema and vacuolization with a fine granular infiltration, or degeneration occupying the vacuolated cells and the interstices. Some mitotic figures are noted.

Stratum Germinativum—Same as above. The pigmentation in areas examined is normal.

CORIUM

Pars Papillaris—The most notable feature is again the edema, with a dilatation of the blood vessels and some cellular infiltration and hematin crystals.

Pars Reticularis—Here the collagenous bundles are still more widely separated, and the cellular infiltration is more marked. In the lower strata and in the trabeculæ extending into the areolar tissue red blood cells, polymorphonuclear leukocytes, fibrin, and endothelial cells are to be seen in abundance. Vessels are to be seen in longitudinal section and cut across. They are widely dilated. Some are blocked with endothelial cells, leukocytes and fibrin, while many of the capillaries are seen filled with red blood cells in many layers. One vessel in the hypoderm shows, in many successive sections, absence of the elastic fibers in about one-quarter of the circumference with separation of the coats, and opposite this there is an area of the areolar tissue, filled with red blood cells, leukocytes and fibrin; evidently therefore a rupture of the vessel wall has occurred—an interpretation borne out by the evidence elsewhere of early thrombosis. The endothelial cells free in the sections show degenerative changes.

The bacteriologic study of the sections is much more interesting. As you are no doubt aware, the meningococcus has been found in the secretions of the nose, the eyes, the bronchi in pneumonia, in the pus of complicating joint affections, the urine, subcutaneous abscess and in the blood. In the last it has been demonstrated in smears by Simon on two occasions and once by Skilton.

Dr. Koplik states on page 502 of Osler's "Modern Medicine," first edition, "Although there may be abscesses in the skin and purulent infiltration, as yet the intracellular diplococcus has not been found in the skin lesions. In the herpes both on the face and trunk no diplococcus have been isolated from the fluid, but there is purulent infiltration and increase of the fixed cells of the tissues." Again on page 513 he states, "Subcutaneous abscesses have been mentioned in various epidemics. In some of these subcutaneous abscesses the diplococcus has been found."

A great many authorities have been consulted and so far as can be found the meningococcus has not been demonstrated in skin sections, although in cases with cutaneous hemorrhages it would be reasonable to expect to find it. With the Gram stain it was rather difficult to satisfy one's self that it could be located, but with the Pappenheim-Saathoff stain the difficulty was at once removed and the meningococcus was observed and demonstrated to several bacteriologists and pathologists. In these sections it is to be found both intra- and extracellularly within the capillaries as well as free in the tissues.

CONCLUSION

In conclusion I would like to draw your attention again to the almost complete absence of clinical evidence of cerebrospinal involvement and the striking cutaneous picture, substantiated by the macroscopic findings of the pathologist and the dermatologic report. It would seem that when the spinal symptoms are marked the cutaneous symptoms may be negative and *vice versa.*

That this interrelationship holds I have long been convinced. In the infectious diseases both during the early and late periods of the illness, I have noted repeatedly marked cerebral symptoms as evidenced by stupor, low muttering delirium, and slight retraction, possibly edema of the brain, relieved by a profuse cutaneous eruption.

In one case, observed in 1906, a boy of about nine had, after an attack of measles, compression of several weeks' standing, evidenced by melancholia, with at times a cry like that heard in tubercular meningitis. He was entirely relieved following the most pronounced attack of *urticaria* that I have ever seen. Incidentally this boy's teacher told me that before his illness he was a good mathematician and a poor reader, while afterward he was a good reader and a poor mathematician.

Another case: A man ill with scarlet fever, erysipelas and associated cerebral symptoms became normal and made a splendid recovery after an outbreak of urticaria.

This has been observed so frequently that I have come to regard an outbreak of a cutaneous eruption as a very favorable prognostic omen.

I wish to thank Dr. Haynes, on whose service this case occurred, for the opportunity of presenting it; the dermatological department of the Vanderbilt Clinic for the preparation of the skin sections; Dr. Park for the co-operation of the Research Laboratory, and Dr. J. A. Hall for the use of his photographs of the patient.

INVASION OF THE BODIES OF INFANTS BY DYSENTERY BACILLUS—*B. dysenteriæ* of the mannit fermenting group has been demonstrated by C. Ten Broeck (Boston Medical and Surgical Journal, 1915, Vol. CLXXIII., p. 284) in the circulating blood of an infant suffering from infectious diarrhea. Eleven blood cultures made from other cases of diarrhea and cultures made from the organs of 14 cases were all negative for dysentery bacilli, and the one positive finding is probably an accidental invasion rather than a usual feature of the disease.—*The American Journal of Obstetrics.*

THE AUTO SERUM TREATMENT OF CHOREA *

Preliminary Report

BY A. L. GOODMAN, PH.G., M.D.

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It is a well-known fact that up to the present time the treatment of chorea, with or without medication, is very unsatisfactory, and that an attack usually lasts from four to six weeks or longer. Some cases do well with rest alone; some improve more rapidly with medication; and others do not improve either with rest or medication and the symptoms continue sometimes for months.

Among the first to undertake the etiological investigation of chorea were Wassermann and Westphal. In 1889 they published the finding of a streptococcus which they believed to be the cause of chorea. This isolated streptococcus, when injected into guinea pigs, caused a rise in temperature, swollen joints, and choreiform movements. Since then many other investigators have published their results, but up to the present time no distinctive organism has been demonstrated as the cause of chorea. The streptococcus viridans has been isolated from the blood in a few cases. The relationship of chorea to syphilis has been suggested and disproved. The changes in the blood, and examination of the spinal fluid, have also been intensively studied, but nothing of any importance has been found.

My attention was attracted to the subject about four years ago in the Children's Division of the Harlem Hospital, when 2 cases admitted to the wards with the diagnosis of chorea developed all the classic symptoms of acute miliary tuberculosis and died. On the autopsy table the miliary tubercles seemed to be restricted to the central nervous system. It occurred to me then that a possible reason for our inability to treat chorea successfully was due to the fact that all methods of treatment did not reach the seat of the trouble, which existed in the central nervous system. Being firmly convinced that the disease was of an infectious nature, I felt that some procedure which could be directed to the central nervous system directly would be of great benefit.

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* Read before the New York Academy of Medicine, Section on Pediatrics, May 11, 1916.

Method of Treatment—Our method of treatment is briefly as follows: After having excluded tuberculosis and syphilis, we permit the child to lie in bed for three or four days or longer, without any medication. We then withdraw from a vein 45 or 50 c.c. of blood, and rapidly centrifugalize it. The serum is then pipetted off and kept on ice. A lumbar puncture is performed in the usual manner. The fluid is very slowly withdrawn, and about 20 c.c. of the fluid is collected. The serum is then heated to body temperature, and very slowly injected into the spinal canal. Such an injection should take from ten to fifteen minutes, and usually 15 to 18 c.c. of the serum is used. The patient should retain the recumbent position for at least one hour after the injection.

After having made a number of investigations, both chemically and bacteriologically, of the blood and spinal fluid, to convince myself of the harmlessness of injecting the serum of these patients into the spinal canal, I made my first injection in April, 1913. Following this first injection, the patient went into a deep coma, which lasted for thirty-six hours. Upon regaining a normal mentality the choreiform movements had entirely disappeared. In studying the cause of the coma it occurred to me that it might be due to the fact that the child had been receiving chloral and codein to control the violent chorea movements, and in treating subsequent cases this proved to be correct. Before giving the injection we always permit the patient to be without medication for at least four or five days. It seems that there must be some chemical action in the blood plasma which causes a very potent action of the drugs when injected into the spinal canal.

After I had given a number of these injections, Passini published a report of a number of cases in which he only withdrew the spinal fluid, and believed to have seen a benefit in 3 of the 5 cases reported. I tried this method but found it unsuccessful. As no further reports have appeared from this author, I believe that he is of the same opinion. I also tried to see if we could use the serum of 1 case and inject that into others suffering from the same disease, but the results were not successful. It is absolutely necessary to use the serum of the same patient in order to get the result.

Later Acuna reported the intraspinal treatment with magnesium sulphate. With this I have had no experience, but Heiman recently reported on its unsuccessful application.

Before giving the auto serum injection, I desire again to speak of the necessity of allowing the patient to be without all forms of medication for at least five to seven days, so as to be sure that all drugs have been eliminated from the system.

The result from the intraspinal injection can be demonstrated within the first two or three days. At times there is a slight reaction due to a mild rise in temperature, accompanied at times with a slight headache. This does not occur in every case. Sometimes there is vomiting, and I believe in these cases that it may be due to the injection of too much serum, causing increased intracranial pressure.

The quantity of serum to be injected in each individual case must be studied carefully. We have made repeated investigations of the blood and spinal fluid and have found them always sterile, with a negative globulin and cell count. An extensive study of the spinal fluid in these cases will appear shortly from the pathological laboratory of our hospital.

With all the treatments hitherto published, the course of an infectious chorea lasts from four to six weeks or longer; with the auto serum treatment the result is manifested within two or three days. Sometimes the patients need a second injection, and sometimes a third. Usually one injection is sufficient. We have had 2 cases return within a year with a relapse. These relapses are usually very much milder and more amenable to treatment. We have also injected three adults, with chronic chorea, and all have been cured. Of the 30 cases treated, so far we have had no untoward results. It is amazing to see how quickly most of the cases respond to the treatment. I will leave the detailed study of individual case reports for a subsequent article and will append here a brief abstract of the cases treated.

CASES TREATED

	Sex	Age	No. of injections	Result
1.	Male	14	1	Cured
2.	Male	13	2	Improved
3.	Male	8	1	Cured
4.	Female	8	2	Cured
5.	Female	11	3	Cured
6.	Same, readmitted		3	Markedly improved
7.	Female	7	2	Cured
8.	Same, readmitted		2	Cured
9.	Female	9	1	Cured

	Sex	Age	No. of injections	Result
10.	Female	10	4	Absolutely cured
11.	Female	7	2	Cured
12.	Male	10	1	Cured
13.	Male	6	2	Markedly improved
14.	Male	7	1	Cured
15.	Female	13	1	Improved
16.	Female	4	3	Cured
17.	Female	7	1	Cured
18.	Female	8	3	Unimproved
19.	Female	12	2	Markedly improved
20.	Male	8	4	Markedly improved
21.	Female	17	2	Cured
22.	Male	8	1	Cured
23.	Male	7	1	Markedly improved
24.	Male	11	4	No improvement
25.	Female	6	3	Slight improvement
26.	Female	28	1	Cured
27.	Female	11	1	Cured
28.	Male	12	1	Cured
29.	Male	8	1	Cured
30.	Female	9	1	Cured

Summary—Of the 30 cases, 18 were female and 12 were male. The youngest case injected was four years of age, the oldest, twenty-eight.

Of the 30 cases injected, 18 were under ten years of age, 10 were from ten to fifteen years of age, 1 from fifteen to twenty years of age, and 1 from twenty to thirty years of age.

Of the 30 cases treated, 14 received one injection, 8 received two injections, 5 received three injections, and 3 received four injections.

Of those receiving one injection, 12 were cured and 2 markedly improved.

Of those receiving two injections, 5 were cured and 3 markedly improved.

Of those receiving three injections, 2 were cured and 1 markedly improved. 1 slightly improved, and 1 unimproved.

Of those receiving four injections, 1 was cured, 1 markedly improved, and 1 unimproved.

To explain our interpretation of the results, cured means absolute cessation of all twitchings within a week. Markedly improved, a cessation of all twitchings within two weeks. Slightly improved, when the twitching disappears at the end of the third week, and unimproved, if the twitchings are still present during the fourth week. Two of the cases reported are relapses. One occurred after nine months, and the other after eleven months.

At present we are trying to find out whether the actual value of the procedure is due to an antibody, an enzyme, or protein body. At any rate, a remedy that will relieve the distressing symptoms of chorea is worthy of our consideration.

To Drs. Garbat, Leopold, Moffett, Orth, H. Cohen and Sanders, of the hospital; I desire to express my sincere appreciation of their earnest co-operation.

136 West Eighty-seventh Street.

CONGENITAL DEXTROCARDIA, WITH PATENT INTERVENTRICULAR SEPTUM—R. D. Moffett and S. Neuhof (American Journal Diseases of Children, 1915, Vol. X., p. 1) record a case in a boy aged three and one-half years. The family history was negative as regards rheumatism, syphilis and tuberculosis. The patient was a full-term child who had always been blue and short of breath. The fingers and toes were clubbed. The heart showed a strong heaving impulse on the right axillary line and in the epigastrium. There was a marked systolic thrill over the entire precordium, most marked at the lower end of the sternum and in the epigastrium. The apex-beat was felt most prominently 6.5 cm. to the right of the mid-sternal line. On percussion the left border was at the left sternal margin. The right border in the sixth space was 9 cm., in the fifth space 8 cm., in the fourth space 7 cm., in the third space 5 cm., and in the second space 3 cm. to the right of the mid-sternal line. There was a loud systolic murmur corresponding to the area of palpable thrill. X-rays and an electro-cardiogram confirmed the diagnosis of dextrocardia, a correlation of the physical and fluoroscopic signs—thrill and murmur over the entire precordium, but most prominent at the xiphoid; apparent absence of the radiographic shadow of the pulmonary artery; an enlarged "left" auricle; an enlarged "right" auricle, "left" and probably also "right" ventricle, pointed toward patent foramen ovale and interventricular septum as the probable congenital lesions. Death took place, but no necropsy was obtainable.—*The British Journal of Children's Diseases:*

EARLY MORNING TOXIC VOMITING IN CHILDREN*

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The purpose of this communication is to direct attention briefly to the vomiting of children, which not infrequently occurs in the early morning, either before or soon after the first feeding. This vomiting is often of toxic origin, as indicated by the fact that the vomitus after the long night period contains no food residue, if before the first morning feeding; and if after this feeding, only food from this meal. In this respect, it is sharply distinguished from the vomiting of undigested and fermenting food in cases where failure of gastric digestion, from whatever cause, is immediately responsible for the emesis. This latter type of vomiting is more prone to occur later in the day after the stomach has been taxed by one or more feedings.

That some vomiting is toxic in origin has become more and more apparent with our increased familiarity with the so-called cyclic or recurrent vomiting; yet the cases to which I refer have neither the characteristic histories nor the clinical symptoms and course of the recurrent type.

One typical instance will serve as well as many to represent this class.

In July, 1915, a boy three years old was feverish during the night. Early next morning, after awakening, he vomited fluid free from food residue. By the time of my visit, about 10 A.M., his bowels had acted from a laxative given the evening before, and the stool had a markedly foul odor, and contained some mucus. Free purgation with fluid citrate of magnesia and the administration of salol, were followed by defervescence and the disappearance of odor.

Again, in January, 1916, the same boy, having had two recent nasal colds, vomited in the early morning, and had a temperature of about 102° F. Careful physical examination having revealed nothing of moment, and despite the fact that the bowels had moved normally the previous day, the tentative diagnosis was made of disturbance of the intestinal tract—with the reservation that we might be dealing with the initial symptoms of an infectious cold still prevalent in the household. Calomel was given in divided doses, followed by the citrate of magnesia, and produced several very foul stools, with considerable mucus. The fever then fell, and the stools became normal under the administration of salol and four minim doses of castor oil.

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* Read at the Twenty-eighth Annual Meeting of the American Pediatric Society, held at Washington, D. C., on May 8, 9 and 10, 1916.

Similar cases could be multiplied from my own experience, and doubtless from that of any pediatric practice. I have therefore come to look upon early morning vomiting as pointing to the probability of a toxic condition arising in the intestinal tract—in fact, as a sign of value when in doubt as to the condition or the cause of the temperature.

What, then, of the processes which lead to such vomiting, and why should it occur so frequently in the early morning, although it is possible that vomiting at other times of the day may have a similar origin?

When the chemistry of the intestinal tract goes wrong, either slowly and cumulatively, as doubtless usually obtains in recurrent vomiting, or more abruptly, with the fermentative or putrefactive processes set up by the aid of bacterial agencies, absorption of some of the products into the circulation is certain. Of the degree of the natural power of the organism to cope with these, either by metabolic or excretory means, we know but little.

Fermentative processes, owing to the irritation caused, are more prone than putrefactive processes to set up a conservative diarrhea in an effort at elimination. With free drainage of the intestinal tract, there is, without doubt, excretion through the mucosa of the intestine which serves to some extent to offset the absorption. But with actual or with relative constipation, and consequently lowered elimination, the positive balance of absorption gains the upper hand. The effects of milder degrees are familiar in the dullness, depression of spirits, headache, lack of appetite, coated tongue, and even some feeling of nausea—in both adults and children. If not too habitual, this syndrome is promptly relieved by free catharsis, which not only prevents further absorption but opens the channels for active excretory elimination.

The toxemia of recurrent vomiting is probably of gradual and cumulative evolution, coming to a head with the development of marked or relative constipation, or precipitated by some unusual factor—fatigue, nervous strain, the onset of one of the infectious diseases, or the taking of an enesthetic. Here elimination is slow and vomiting prolonged. Fever is not a constant symptom.

With a more active and fulminating toxic absorption, such as we may assume occurs with an acute putrefactive process in the intestine, fever is a usual accompaniment, often rising sharply, and if a conservative diarrhea be not quickly established the gastric mucosa participates in the effort at elimination.

It has been my observation that when a child vomits during the night the vomitus almost invariably contains large quantities of partially digested food; while the early morning vomiting, to which I call attention, consists only of fluid and mucus, provided the first feeding has not been given. It seems hardly probable that gastric stasis, which so often accompanies acute indigestion or the onset of febrile conditions, could be overcome in the final hours of the night, and the stomach be completely emptied of all vestiges of food before the early morning vomiting occurred.

It is much more plausible to assume that in the early morning type the disturbance of digestion has been primarily intestinal, not gastric; that there is an attempted elimination of absorbed toxic principles by the gastric mucosa; and that these accumulate in the stomach during the hours of sleep when all reflex sensations are more or less deadened by slumber, only to assert their presence on awakening, in nausea and vomiting.

Reaccumulation in the stomach of sufficient quantities to cause a recurrence of such vomiting is comparatively rare during the waking hours. At all events, after the stomach has been emptied by one or two acts of emesis at short intervals, the vomiting has not the persistent character of the true recurrent type. This may readily be due to the difference in the nature of the toxic products in the two conditions, their quantity in the circulation, or their rate of excretion.

If vomiting does not occur before food is taken, it may occur when the first food is given, especially if that feeding be milk. So common is it for children to vomit in the morning, if they vomit at all during the course of minor illnesses, and not toward night—as might readily be expected, if due to overtaxing of the stomach—and so frequently will milk, if given at the first feeding, be ejected in large masses, that it has come to be my habit, where in the presence of fever I suspect toxemia—to order for the first morning feeding broth or broth and barley gruel. By thus avoiding the formation of acid coagula, I feel that I have often averted the tendency. Dilution of the stomach contents, or the demulcent action of the barley, when added, may play some part in this result.

A further characteristic of both toxic types of vomiting, as distinguished from that of acute gastric indigestion, is the quicker recovery of the digestive functions of the stomach. In the toxic types, the stomach functions are only slightly impaired, and as soon as elimination has been accomplished by free catharsis, and vomiting has ceased, simple food will be received and digested. Appetite, which is the best single indication of digestive capacity, also returns more promptly.

The extreme caution so often displayed in resuming feeding after an attack of recurrent vomiting, and the consequent unfortunate condition of under-nutrition so often observed in those whose attacks recur at comparatively short intervals, are both entirely unnecessary. These children should be fed simply, as soon as vomiting ceases; and when appetite returns, diet of a simple character should be abundant. The sole obstacle to such prompt feeding in the acute toxic type is the state of the intestinal digestion, which, differing from the recurrent type, has been acutely disturbed. But with proper elimination and suitable remedies the resumption of ample though simple diet may often be prompt and certainly need not be long delayed, save where diarrhea or a colitis invites caution during the summer months.

I am not aware that the occurrence of vomiting in the early morning has received any special attention, and present my observations with a view to inviting discussion.

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THE BLOOD-PRESSURE IN CHILDREN SHOWING ORTHOTIC ALBUMINURIA—M. H. Bass and W. Wessler (Archives of International Medicine, 1914, Vol. XIII., p. 39), from examination of 26 cases, came to the following conclusions: The blood-pressure of children suffering from orthotic albuminuria differed but little from that of normal children. In spite of the apparent vasomotor insufficiency which many of the children showed, the blood-pressure both in the upright and recumbent positions, and also after exercise, revealed no characteristic anomaly. Nor could the blood-pressure findings be correlated in any way with the findings in regard to the heart's shape and size and the pulse rate. Children with orthotic albuminuria who showed marked cardiovascular symptoms could not be differentiated by blood-pressure tests from the remainder of the group.—*The British Journal of Children's Diseases.*

A REPORT OF TWELVE CASES OF SPASMOPHILIA, WITH COMMENTS ON ETIOLOGY AND TREATMENT*

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Each of the following cases, in my judgment, showed one or several of the symptoms of the symptom-complex, spasmophilia. These cases have been seen since January 1, 1915, for the most part in private practice. I believe that they show clinical features worthy of recital and comment.

Case I. Boy of four and one-half months, seen January 19, 1915. Weighed 5½ pounds at birth, and artificially-fed from birth. He had had indigestion from his earliest weeks, but had averaged 1 pound gain a month. Top milk feeding had been reduced to skim milk and various carbohydrates had been employed. The history of his present illness was that two weeks ago he developed diarrhea while taking a skim-milk and milk-sugar mixture of the percentage formula .5-9.-1.3, and when the percentage of sugar was reduced to 7 the diarrhea ceased. For two days there had been attacks of cyanosis and crowing. During my visit he had an attack of cyanosis, with spasm of the hands and feet of a few moments' duration. His abdomen was distended and tympanitic and his stools were sour and acid, averaging three in twenty-four hours. He was given a curd and arrowroot mixture of the percentage formula .5-2.-2. There have been no further spasmophilic symptoms.

This infant had been overfed with fat, then with carbohydrates, and showed acid intestinal fermentation.

Case II. Boy of fourteen months, seen March 5, 1915. He had been fed since birth on condensed milk, and for several months had received bread and cookies. At three months he was said to have had an attack of spinal meningitis.

There had been attacks of crowing for six weeks. Ten days ago swelling of hands and feet appeared. For three days he had had stiffness and immobility of the extremities. Besides the typical tetany he showed marked edema of the hands and feet. He was fat and pale and showed intestinal fermentation by distended belly and acid stools averaging four in twenty-four hours. On a Larosan mixture of the formula 2.-2.25-2.5, the tetany disappeared in two or three weeks.

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* Read before the New England Pediatric Society, December 10, 1915.

In this case there had been carbohydrate overfeeding with acid intestinal fermentation and both chronic and acute water retention.

CASE III. Girl of nine months, seen March 9, 1915. She was breast-fed eight months. In the month since weaning she had gained 1 pound and weighed 20½ pounds. Her feeding was in my care and she was taking a mixture of whole milk, barley and milk sugar, of the percentages 3.-6.-2.75, 42 calories to the pound.

Without previous signs of ill health three convulsions occurred within twelve hours. I found nothing to explain these symptoms, except that the stools had become softer, three in twenty-four hours, and acid in reaction. After ordinary immediate treatment she was given a curd and arrowroot mixture of the percentages .5-2.-2. She had no further spasmophilic symptoms, but one month after attack she had lost over 2 pounds in weight, and showed rosary, flaring ribs and flabby musculature.

In this case the acid fermentation of carbohydrates was the only evidence of food disturbance and the spasmophilia preceded any other symptoms of rickets.

CASE IV. A boy of three and one-half months was seen June 5, 1915. On a condensed milk formula containing 10 per cent. sugar he had gained 1½ pounds in two weeks. Then, ten days ago, two convulsions occurred. For eight days he was given Imperial Granum water without convulsions. Whole milk was added in the proportion ⅓ whole milk and ⅔ Imperial Granum water, when within two days convulsions returned and he had about twenty in the day preceding my visit. For two days crowing had been noticed. He showed severe furunculosis of the scalp. His bowels were said to be constipated—two a day. The stool was normal, except acid. He was started on a mixture of 16 per cent. cream, arrowroot and Larosan of the percentages 2.-1.75-2. and had no further convulsions.

The important features of this case, to my mind, are the overfeeding of carbohydrate with fermentation and the furunculosis of the scalp. Furunculosis in my experience is frequently associated with over-feeding of fats and sugars.

CASE V. A syphilitic boy of four and one-half months was seen at the Portland Milk Station March 3, 1915. Two weeks previously he had eighteen convulsions in three days. A spontaneous fracture of the wrist (syphilitic) was attributed to the convulsions. Along with snuffles he had been crowing for one month. During one of his early visits to the Milk Station I witnessed an attack of cyanosis and carpopedal spasm of transitory duration. He had received a mixture of Mellin's Food and whole milk of the percentages 2-6.-2. He was said to be constipated, but had two stools a day. The stools were not remarkable, except for sour odor and acid reaction. On a curd mixture he had two spasms the following day and none afterward.

Convulsions are said to be not uncommon in syphilitic infants. In this case there was prompt relief by dietetic treatment.

CASE VI. A boy of two and one-half months was also seen at the Milk Station April 7, 1915. In the previous week he had gained 1¼ pounds on a Mellin's Food and whole milk mixture of the percentages 1.5-4.25-1.5. Laryngysmus had developed. The stools were acid and there were sore buttocks. He was given a Larosan mixture containing the percentages 3.-1.5-1.5. The crowing continued and it transpired that he was receiving sugar and water freely. He was placed in the good home of an interested woman and made gradual recovery.

I have found that the common practice of giving sugar and water to infants must always be borne in mind in treating dispensary patients.

CASE VII. A girl of eleven months was seen March 21, 1915, during a convulsion. She had had two convulsions at ten months. She was partly breast-fed, receiving also bread and Mellin's Food and whole milk. The only immediate cause for the present convulsion appeared to be the eating of 4 or 5 graham crackers a day during the last week. This child has had no further attacks.

Intestinal fermentation from graham crackers has been common in my experience.

CASE VIII. A girl of fourteen months was seen July 12, 1915. From a 4½ pound premature infant she had grown to 21 pounds in weight. At nine months she had a severe bronchitis. At eleven months she had had boils on the buttocks. Two or three weeks before my visit she turned blue momentarily after a fit of crying. Ten days ago she had an attack of cyanosis, followed by belching of gas. On the day of my visit she had repeated attacks of cyanosis and limpness. She had been rather constipated. She showed some flabbiness of the thighs and furunculosis of the scalp. The stool was normal alkaline. There had been an ammoniacal odor to the urine. She was given 30 grains of bicarbonate of soda daily. On July 15th, two days after my visit, she had a convulsion. Her diet had been 46 ounces whole milk and 10 ounces oat jelly daily, with three tablespoonfuls rice or groats, together with broth and an H. & P. cracker. She was receiving about 1,300 calories a day, or 62 calories to the pound. Beginning with Larosan milk and a much reduced diet, she made good recovery.

This child had further convulsions, I have learned, with pyelitis at about twenty months of age.

The general overfeeding was the only evident error in this case. The furunculosis is of interest. There is the question, did the soda induce the convulsions?

CASE IX. A girl of two years on September 14, 1915, had two attacks of spasms of the hands and feet, with increased reflexes and crying of about fifteen minutes' duration each. At the time I had been attending her for three days for an apparently infectious diarrhea with moderate fever, three to four stools a day, mostly mucus and containing blood the first day. There was an acetone odor to the breath and a faint reaction for acetone in the urine.

CASE X. A boy of seven weeks was seen October 25, 1915. He had been fed with difficulty on various mixtures and had much colic and regurgitation. He gained 23 ounces in four weeks. He had not gained for two weeks. His food was a mixture of whole milk, dextri-maltose and barley of the percentages 2.50-4.-2.25, 68 calories to the pound. His abdomen was distended, tympanitic. His stools were apparently normal. I reduced the food temporarily to 1.75-3.5-1.3. On October 27 he had two attacks of cyanosis with transitory carpopedal spasm. He was then given a Larosan arrowroot and skim-milk mixture of the percentages 3.-2.7-2.75. The skim milk was gradually increased to whole milk. November 13th, because of the importunities of the parents, the baby had lost a little weight. I tried a mixture of skim milk, condensed milk, arrowroot and Larosan of the percentages .3-3.25-1.3. Within twenty-four hours there was another spasmophilic attack. Since returning to the whole milk and Larosan mixture there have been no further attacks.

CASE XI. A boy of three and one-half months, seen November 17, 1915. At seven weeks a diarrhea began and lasted one month. Twelve days before my visit he had an attack of cyanosis with spasm of the extremities of short duration. Six days later he had two such spasmodic attacks. This infant was poorly nourished, with macular eruptions about anus. The stools were soft, sour and acid, three to four in twenty-four hours. The food was a dextri-maltose and cream mixture of the percentages 3.-6.6-1.5. The percentages were changed to 2-3.-1.6, with 30 per cent. lime water. Stools became normal and there has been no symptom of spasmophilia in the last month.

This represents a mild case relieved by a reduction of the carbohydrate and addition of lime, although with this change he received several ounces more whey in twenty-four hours.

CASE XII. A boy of fourteen and one-half months was seen at the Portland Children's Hospital November 9, 1915. He did well for five months on Eskay's Food and whole milk. At five months he had eight convulsions in three days. Following this attack there were constant carpopedal spasms for one month. At seven months he had nineteen convulsions in twenty-four hours. Before these convulsive attacks his hands and feet were swollen for several days. He was given nothing but oatmeal water for three months; became greatly emaciated, but had no convulsions. At ten months he was started on malted milk and gained rapidly. At one year he had diarrhea one week. Beginning at ten months he had a painful swelling of the knee, which persisted. This was associated with fever and wasting. The temperature was remittent, between 101° and 103°. The diagnosis was tuberculous arthritis. When I saw him there was extreme tenderness of both legs, pseudo-paralysis and ecchymosis of the gums about the four erupted teeth. The white line of Fränkel was conspicuous by X-ray. Following the giving of orange juice, improvement was gradual, but after ten days the temperature was normal and he moved his legs.

At thirteen months the addition of whole milk to the malted milk was tried cautiously, beginning with two teaspoonfuls malted milk and one teaspoonful whole milk in 8 ounces of water. When the whole milk was increased to one tablespoonful a convulsive attack occurred of seven hours' duration. A return to malted milk was made and it was decided that he could not take cow's milk. Cow's milk always constipated him. After scorbutic symptoms were relieved he was given a curd and arrowroot mixture. Two days later he was given a mixture of milk, arrowroot and Larosan, containing half milk. The amount of milk in twenty-four hours was quickly increased to 24 ounces, giving 40 calories to the pound, but there were no untoward symptoms.

The occurrence of spasmophilia and scurvy simultaneously is of interest. The apparent idiosyncrasy of this child to cow's milk, the excitation of spasmophilia from its ingestion in small amounts, and the good tolerance to cow's milk in a non-fermentable form are striking features of this case.

In this report of cases there has been no attempt to describe subsequent feeding. As a rule, the carbohydrate was kept as low as seemed safe and increased slowly, guarding against symptoms of fermentation. I have not had as good results with cane sugar, milk sugar, or dextrin and maltose addition as with rice, barley, arrowroot and wheat. In some cases it seemed best to use cream and casein mixtures in order to get a very low carbohydrate and a fair food value. I have used home prepared curd mixtures at times, especially at the start, in severe cases. On the whole, I have found Larosan most convenient. I believe that a considerable amount of lime is indicated. It is my opinion that chloride of lime may owe its beneficial action to the prevention of intestinal fermentation.

The frequent association with acid intestinal fermentation of carbohydrate, I consider the most impressive feature of these cases. Finkelstein first attributed spasmophilia to some irritant contained in whey. Recently Grulee demonstrated that removal of whey from milk feedings was followed by a disappearance of spasmophilic symptoms. More recently Brown and Fletcher have reported cases of spasmophilia from which they conclude that the symptoms are induced chiefly through overfeeding of carbohydrate, and particularly carbohydrate that has been cooked.

Their opinion raises the question of the absence of vitamines causing spasmophilia. Nearly all of my cases were relieved and remained free from symptoms on a completely cooked diet, therefore I cannot believe that vitamines are concerned in spasmophilia.

Brown and Fletcher also are of the opinion that constipation contributes toward the production of spasmophilia. It has been my experience that the properly-fed artificial infant is generally constipated. Some of my spasmophilic patients showed bowel looseness. It seems, nevertheless, probable that slight bowel looseness is a saving process against spasmophilia, that is, to a certain extent an infant overfed on carbohydrate is better off with loose bowels rather than with constipation. As would be expected from the character of their food, all of my patients were constipated when their symptoms were relieved. This constipation must generally be relieved by laxatives.

It is not my purpose to discuss particularly the many metabolism experiments that have been conducted in spasmophilic infants. That the balance of inorganic salts is disturbed is probable. That there is frequently acute water retention is certain. Acidosis of some kind and degree, I believe, is present and the function of the parathyroids may be disturbed. The exciting cause, however, appears to be in the food.

On a diet excessive in carbon some infants show periodic disturbances, such as asthma and digestive crises; other infants give evidence of chronic disturbances of metabolism; for example, rickets and eczema. Commonly, I believe excessive carbon feeding through over-energy transformation produces a chronic acidosis. Under foregoing conditions I have frequently noticed an ammoniacal, often irritating, urine, also a lowered resistance to pyogenic infections, particularly furunculosis, styes and pyelitis. Under similar conditions in my experience spasmophilia occurs.

The theory of Francis Hare that excessive carbon feeding gives rise to carbon accumulation, or an energy overplus which results in periodic explosion, is fanciful, but it gives an excellent working basis for the treatment of recurrent vomiting, bronchitis and asthma in children, as has been expressed by Kerley. The same idea in my judgment is applicable in spasmophilia, and similar treatment is effectual. The seasonal incidence and familial character of spasmophilia are those of the periodic disturbances of children, and my experience leads me to believe that spasmophilic infants frequently show these recurrent disturbances later as children. It is my opinion, therefore, that spasmophilia occurs in infancy rather than other periodic explosions because the nervous system provides the most susceptible tissue.

In conclusion I would state my opinion that spasmophilia is due to overfeeding, especially of carbohydrate food, more especially in fermentable form, and that dietetic treatment similar to that of Grulee is most effectual.

A CASE OF HIRSCHSPRUNG'S DISEASE, WITH BIBLIOGRAPHY TO JANUARY 1, 1916

BY R. CADWALLADER, A.M., M.D.

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F. L., aged nine, entered the San Francisco Hospital with the diagnosis of tubercular peritonitis. When I saw him on the following day, January 7, 1916, his condition was as follows:

He was a thin, anemic boy of the apparent age of six; skin dry, tongue coated, dentition poor, a large areated alopecia on the frontal eminence, and mentally alert. His heart and lungs were normal, temperature 98°, pulse 80 and not hard, no glandular enlargement. His abdomen was enormously distended and tympanitic. It was nowhere tender to palpation. The distention was so great that it was impossible to feel any of the viscera. He said that he had always been that large and that the boys called him "egg-belly" at school. He also said that his bowels never moved without injections and that he had had no movement for a week or so. A large dose of castor oil given the day before had not operated and part at least had been vomited. While the whole abdomen was enlarged there was a peculiar line across it running from about the left anterior superior spine to the neighborhood of the cartilage of the eighth right rib. To the left of this the distention was much more marked and here the abdominal wall seemed to rise as if by a step. After examination he was ordered to be given large doses of Epsom salts.

The following day I was able to get in touch with his mother, and from her I learned that this condition first began a few days after his birth, which was normal in every way. She stated that he was habitually constipated and that his bowels never moved without enemata. He had gone a week at a time without a passage, but that this was the longest and the worst spell he had ever had. He was behind in his studies at school, and was half sick all the time. Many physicians had seen him from time to time, but none had offered any opinion as to the cause or given him more than temporary relief. Nothing taken by mouth had ever started the bowels when in this condition.

Large enemata of glycerin and salts twice daily were ordered, and in two days a fecal mass could be palpated deep in the right flank. In passing let me say that the first good enema brought out over 5 pounds of scybalous feces and whole grains of popcorn, eaten during the Christmas holidays. The enemata were kept up for several days and reduced the distention a good deal, but he remained bloated with gas, though the abdomen became fairly soft.

During this time various kinds of purgatives were tried, but had no effect whatever. Several hypodermics of pituitrin were used without any noticeable effect. A von Pirquet test made when he first entered showed a negative reaction. At no time did I consider tuberculosis, but at first I did not recognize the type of obstruction I was dealing with.

His appetite was absent at first, but after the colon was emptied he became very hungry. Slowly it became apparent that this was a congenital dilatation of the colon and I began to plan some operative procedure looking toward permanent relief. No X-ray plates were taken.

Of the possible operations a colostomy was discarded. To bring the small intestine to the sigmoid did not seem practicable, as it left the large bowel behind as a reservoir for retained feces. To open the appendix and use it as a tube through which to flush the colon, while simple, forced him to a continuous daily treatment of himself. To exsect the colon was formidable, but if successfully withstood seemed to be the operation of choice. Plication was also considered, but while lessening the caliber it in no way altered the pathology.

Determining to be guided largely by circumstances, I opened the abdomen by a median incision January 19, 1916. Instantly there rolled out a mass about the size of a football. The walls were thin and the contents gas. Over the surface of the mass the blood vessels were as large as goose quills. The long axis, about ten inches, was sharply defined from the normal gut. An inch from this line the colon was clamped and it was then seen that the tumor was the upper sigmoid, descending colon and a part of the transverse colon. The mesocolon was accordingly tied, the tumor cut away and an end to end anastomosis done. A stab wound was made in the right flank and the appendix freed and drawn through this puncture as a precautionary measure. This was never used; it became black, was ligated and cut away on the second day.

Recovery was uneventful. He sat up in bed the fifth day, was in a chair on the seventh, the stitches were removed the tenth and he was discharged February 5th, on the seventeenth day.

The bowels were moved by gentle enemata after the third day and after the fifth he was given a half ounce of liquid petrolatum daily. When discharged there was no distention, he was ravenously hungry, his bowels were moving spontaneously every day, as a rule, but occasionally an enema seemed desirable.

Six weeks after the operation his mother tells me that, beyond supervision of his diet, and seeing that he takes his oil, he is as normal as any of her other children.

The condition of this boy's colon could best be accounted for by assuming a congenital lack of inervation of the dilated portion. The walls were very thin and if we could assume that there were no motor nerves to the muscular layers, then the dilation and absence of motility are accounted for.

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A TEST OF CLEAN MILK PRODUCTION—Under the direction of North (American Journal of Public Health, June, 1915), a comparative test of clean milk production was made under the following conditions: Ten dairymen known by their low bacteria records to be expert clean milk producers were placed on ten dairy farms in the neighborhood of Philadelphia which were ordinarily equipped and which had only fair records under the owning dairymen. The experts were given sterile cans and sterile covered buckets with 5-inch openings. Under the conditions of the test they were to milk the cows on the respective farms once, and handle the milk until it was placed either in ordinary tanks of cold water or in ice-water for cooling purposes; then, when the milk was transported to the milk stations, bacterial counts were to be made. The result of the test was that, whereas the owning dairymen of the ten dairies had bacterial counts on April 5th of 60,000 as a minimum to 4,830,000, the visiting experts April 6th produced milk which had counts ranging from 800 to 7,000, with a maximum in one instance of 61,000, in which the expert complained that the barn had been swept just before he milked, raising much dust. North concludes that the fundamentals of clean milk production, which were present in this test, are: milking with dry hands into covered milk pails; proper washing and sterilization of milking pails and milk cans; cooling milk by placing cans in tanks of cold water or ice-water, and regular laboratory tests of milk for bacteria and payment based on laboratory tests. The last is the essential stimulus to clean milk production. North says he has revised his opinion in regard to the relative values of equipment and dairymen, so that the dairyman should count for at least 90 per cent. and equipment for the other 10 per cent. in clean milk production.—*Journal of American Medical Association.*

STUDIES ON PARENTERAL INFECTIONS *†

BY JESSE R. GERSTLEY, M.D.
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In many European clinics the importance of coughs and colds as etiologic factors in producing secondary diarrhea in infants has been noted for some years. Indeed, in some clinics where we have worked the tendency is to attribute almost every case of infantile diarrhea to one of these so-called "parenteral infections." The idea is that the infection in some way so injures the child's intestine that its tolerance for food is reduced, and, as a result, secondary food disturbances easily arise. We have seen this demonstrated repeatedly. In the Finkelstein clinic, for example, we noticed time and time again that when a child with a coryza or bronchitis was brought into a ward of healthy, thriving infants, the infection rapidly spread throughout the ward and soon nearly every child developed a more or less severe diarrhea. These disturbances sometimes remained limited to the child's intestine, he remained subjectively well, continued to gain and showed no symptom other than a slight increase in the number and a decrease in the consistency of the stools. In the great majority of cases, however, the disturbances became more severe, and if the diet were not changed a true disturbance of nutrition (Ernährungs störung) developed. In speaking of disturbances of nutrition we must emphasize that we mean these in the sense of Finkelstein, namely, clinical entities which can be described by the terms "disturbed balance," "dyspepsia," "intoxication" and "decomposition."

In our experience in the Finkelstein clinic the great majority of all cases of parenteral infection tended to give rise—if untreated—to conditions of intoxication or decomposition. So invariably was this noticed that in almost all cases of nutritional disturbance it became routine to search for an associated parenteral infection and attribute to this the primary cause of the trouble. These cases all tended to become severe, and if the initial dyspepsia were not promptly treated, rapidly became worse.

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* Read before the Central States Pediatric Society, October 16, 1915.

† From the Michael Reese-Sarah Morris Hospital for Children and the Northwestern Medical School.

In our studies of diarrheal cases during the year of 1914* Day and I found only a few cases of true nutritional disturbance and a few cases of true infection. The great majority of them were mild diarrheas and were associated with one or more types of parenteral infection.

We determined then to attack the problem from the other point of view, namely, to study all cases of parenteral infection and to find out in how many of them secondary nutritional disturbances developed—not to study diarrheal cases and then hunt for an associated cough or cold, but *vice versa,* to study coughs and colds and seek an associated diarrhea. We thought we might learn (1) how frequently these disturbances developed, provided the diet was not changed, and (2) what factors were responsible for the production of the disturbance.

During the last year we made a study of some 83 children in our hospital wards and a somewhat greater number in our out-patient department. Of the 83 cases, 52 were over six months of age and 31 were under.

In order to determine what factors in these febrile conditions were concerned in causing a diarrhea, we compiled tables, including the child's age, nationality, birth weight, whether it was of twins, prematurity, its feeding before admission, feeding in the hospital, the diagnosis and the outcome. We were also interested to note if a positive von Pirquet or urinary findings were of significance. To go over all these statistics would be very tedious. Suffice it to say that we were absolutely unable to relate the occurrence of an intestinal disturbance to any one of the above factors. The occurrence of a parenteral infection in many cases seemed to be associated with a mild diarrhea, but only in the fewest of these did this dyspepsia progress to one of the severer clinical types. Indeed, the child seems to have instinctively a protective mechanism in refusing food during these febrile periods—perhaps even the initial vomiting may be a protective feature—and, if allowed to use his judgment as regards the quantity of food, rarely develops more than a transitory diarrhea. This applies particularly to those children over six months of age on a mixed diet. We made it a rule never to force these patients to take food, and, as a result, few of the 52 cases showed more than a slight decrease in the consistency of the stool. And even in the younger infants we were surprised to find, if the infant were allowed to voluntarily reduce the quantity of his food, how rarely the associated diarrhea progressed to become a true nutritional disturbance.

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* Alexander A. Day and Jesse R. Gerstley. American Journal of Diseases of Children, 1915, Vol. IX., p. 233.

A study of these charts is very interesting, and is particularly so in those few cases of severer disturbances, as it shows how elusive the true etiologic factors are.

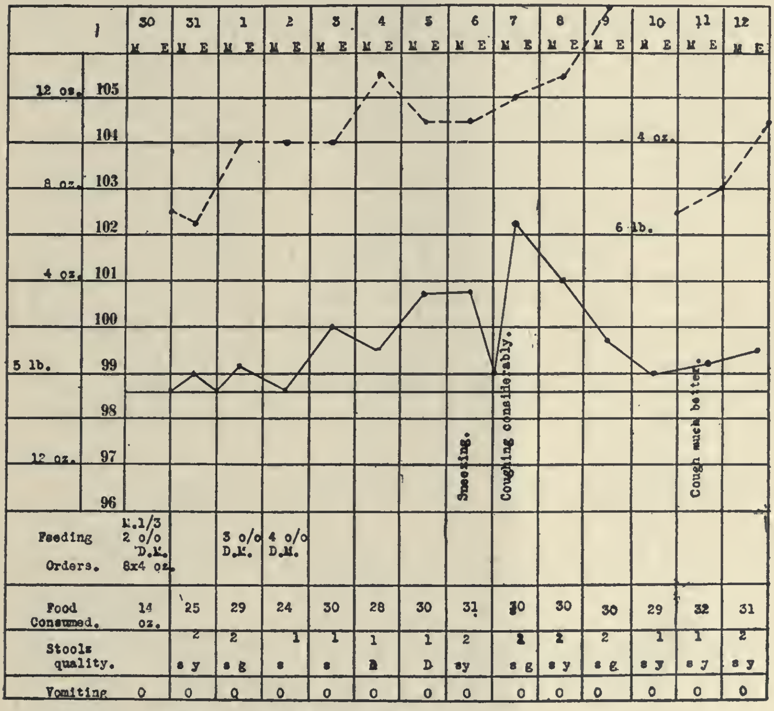

CHART I. Female child aged two months.

She was a seven months' baby, never had received the breast and was brought to the hospital for feeding. The mother had a bad tuberculosis.

Examination showed a markedly undernourished child with a positive von Pirquet. Here we have everything which theoretically should predispose to a bad disturbance—malnutrition, artificial feeding with a high carbohydrate and a positive von Pirquet. In the hospital the child developed a mild diffuse bronchitis and went through this with no change of diet and absolutely no alimentary symptoms.

In this and the following charts the solid line indicates temperature and the broken line indicates weight. In feeding orders M—milk, D. M.—dextri-maltose, E. M.—eiweissmilch. As regards stools N—normal, S—soft, Y—yellow, G—green and M—mucus.

In a group of 4 cases, all under six months, we noted that a cough associated with a mild bronchitis existed for a day or two before fever developed. With the onset of fever a mild transitory diarrhea occurred. This of course suggests that the rise of temperature is responsible for the intestinal injury which predisposes to food disturbances. A study of the literature showed that this view is held by many investigators, but unfortunately the solution is not so simple. A group of 17 cases over six months and 14 under of which Chart I. is typical, showed that these young children may suffer with febrile disturbances and show no trace of alimentary injury.

If mild fever, then, is excluded from our theories we must search elsewhere. A group of 4 cases—all under six months of age, of which Chart II. is typical—gave us another suggestion,

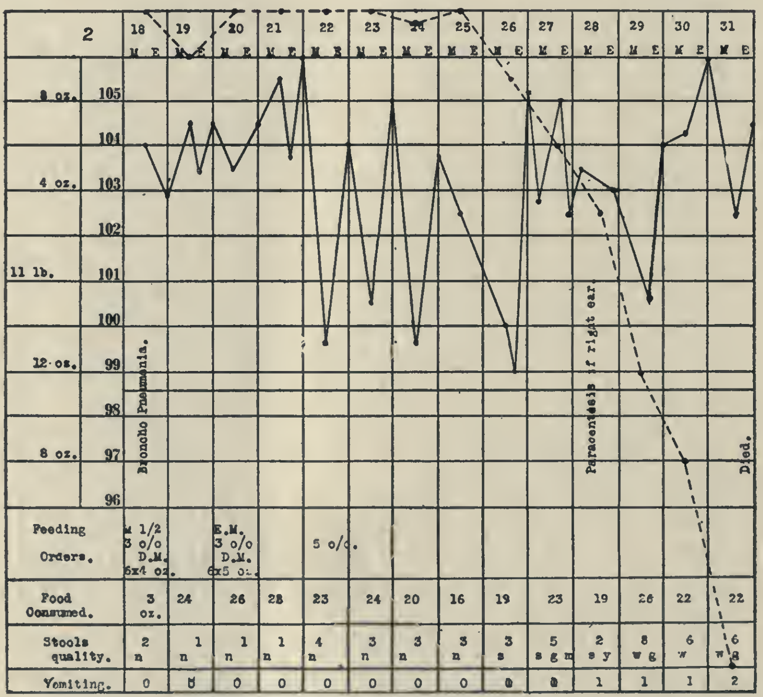

CHART II. A little boy aged five months was brought to the hospital for cough of a week's duration. Past history was negative. After four weeks of age he received only a milk mixture.

Examination showed a fairly well nourished but rachitic child with a left-sided lobar pneumonia. Von Pirquet negative. Urine showed albumin and casts.

In spite of treatment with eiweissmilch the number of stools increased and we had a true secondary nutritional disturbance as shown by the marked drop in the weight curve.

namely, that a secondary disturbance need not necessarily depend upon fever, but upon long continued high fever, *i.e.*, a severe infection, as shown by the urinary findings.

Chart III., typical of 5 children under six months and 23 over, proves this not to be true.

Chart IV., of a group of 3 cases, would suggest that these secondary disturbances arise, associated with severe infection and high fever in children who are constitutionally inferior, but Chart V., typical of 5 younger and 2 older infants, casts doubt upon such a hypothesis.

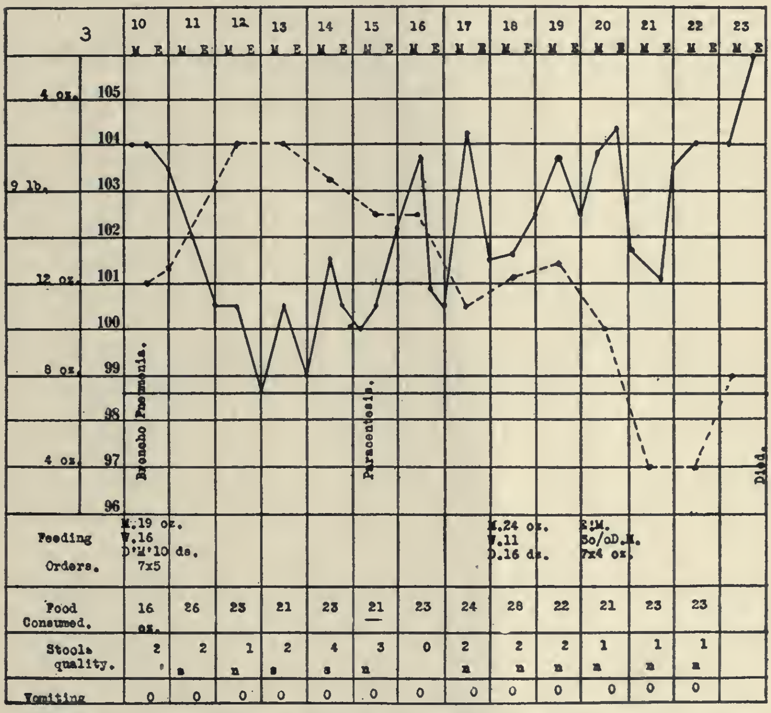

CHART III. Typical of 5 children under six months and 23 over—shows a premature seven months' baby, brought to the hospital for cough and fever of one week's duration. The child had never received the breast.

Examination showed a poorly nourished rachitic child with a diffuse bronchopneumonia. Von Pirquet and urine were negative. Here then is a large group in direct antithesis to the previous cases, a severe infection complicated by an otitis, ending in death, and no trace of any intestinal symptoms. The weight curve showed even a rise just before death.

Lastly, our study showed one more interesting type of case (Chart VI.). Such a chart would usually be interpreted as a mild parenteral infection, causing a mild secondary diarrhea. When the infection is overcome the intestinal affair spontaneously corrects itself. From the study of the *chart alone* we believe we would be equally justified in saying that a primary drop in weight predisposed the child to a slight respiratory infection. We were surprised to find if we studied our patients thoroughly and were very careful about the history, how frequently this seemed to occur. Time and time again careful questioning would reveal the fact that the child had had a diarrhea for three to six days before the onset of the respiratory infection. Of course the influence of diminished nutrition as a predisposing factor to various infections is well known, but we were surprised to find how frequently the cough followed the diarrhea. We wish to emphasize this in view of the present tendency to attribute so many cases of existing diarrhea to an existing parenteral infection. We have four curves which seem to suggest the parenteral infection as a distinctly secondary affair, and to show it to improve as the weight curve ascends.

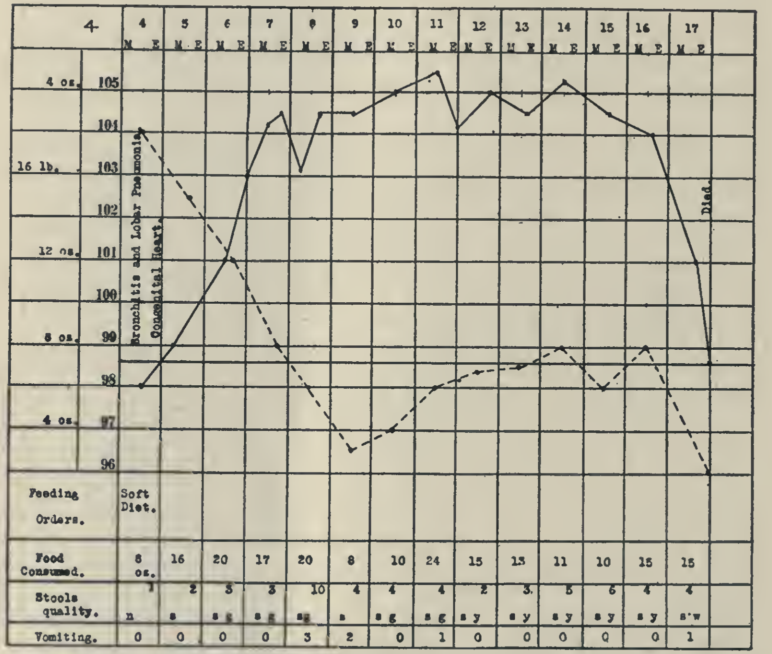

CHART IV. The child, one year old, had always been sickly and was brought to the hospital for congenital heart trouble.

Examination showed a rachitic child with a congenital heart lesion. Von Pirquet negative. Urine showed albumin.

In the hospital the child developed a bronchopneumonia. As the temperature went up the stools became worse until the child instinctively stopped the disturbance by cutting down his food on the 9th. This helped temporarily until a few days later increasing diarrhea and descending weight curve gave evidence of another disturbance.

Discussion—In European clinics, under our own eyes, we have frequently seen parenteral infections give rise to severe secondary nutritional disturbances. In our own study the influence of parenteral infection with regard to the production of severer disturbances seemed almost *nil.* Of the accuracy of both observations we have no doubt and also of definite explanation we have none. We are tempted to believe that the great discrepancy is due to the different conditions under which the studies were made. The European clinic in which parenteral infections were most important was more of the nature of an asylum. The children were brought there in a supposedly normal condition and then kept for some time. In this way they suffered greatly from lack of exercise, fresh air and sunshine. Our studies were made either in our out-patient department, or on children who had just been admitted to the hospital for the present trouble, namely, upon children who up to the moment of observation had been in a normal environment. Whether such an explanation is of

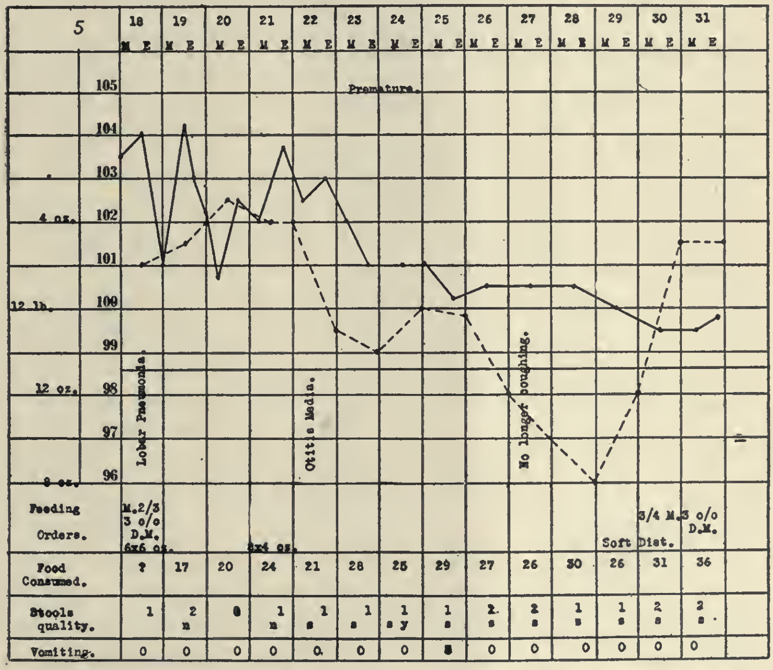

CHART V. shows a little girl nine months of age. She was a premature seven months' baby, weighing 3½ pounds at birth. She never received breast milk, but got different milk mixtures, some of which made her very sick. Two months before admission she had pneumonia. She was brought in for cough and fever. Here we certainly have a constitutionally defective child.

Examination showed a very rachitic baby, severely ill with a lobar pneumonia. Von Pirquet negative. Urine showed many casts.

In spite of this constitutional handicap the child went through a lobar pneumonia and an otitis with not a suggestion of an intestinal disturbance.

value or not we do not know, but it may focus our attention a little more carefully upon the effects of exercise, fresh air and sunshine upon the functioning of the infant's gastrointestinal tract.

Conclusions—From the study of 200 cases of parenteral infection in our out-patient department and in our hospital during the year of 1915, we feel justified in drawing the following conclusions:

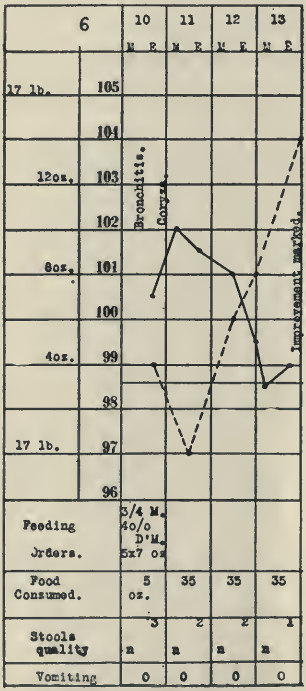

Chart VI. A child aged six months. Past history negative. Breast-fed for five months and then got the bottle. Brought in for cough and colic. Von Pirquet and urine negative.

(1) Parenteral infections in many cases are associated with a mild or moderate diarrhea.

(2) If the child is allowed to drink as he sees fit, this diarrhea rarely develops into a severer disturbance. It almost never does in children on a mixed diet.

(3) The very few cases of severer disturbances which developed followed no rules that we could discover. They did not depend upon: (*a*) anatomical situation of the infection, as bronchitis, otitis or cystitis; (*b*) degree, length or severity of the infection; (*c*) upon constitutional inferiority of the child, or upon (*d*) the outcome of the disease.

(4) In many cases we believe the initial diarrhea and vomiting which occur before admission to the hospital to be due to the invariable dose of castor oil, and some of our charts show diarrheas associated with coughs occurring in the hospital, conditions which seem also to be related to the medication in some way, as, for example, aromatic spirits of ammonia.

(5) In some cases the cough seems directly secondary to the nutritional condition and disappears as the nutrition improves.

Finally, we wish to thank Drs. Abt, Hess and Lackner for the privilege of studying these cases.

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AN UNUSUAL CASE OF HYDROCEPHALUS *

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Cases of hydrocephalus are very common in a large hospital and dispensary service, but the case here reported is unusual because of the enormous size of the head and for the remarkable amount of fluid that was removed from the head by tapping the anterior fontanel. In a review of the literature, the author was unable to find a case in which the measurements of the head were so large or where so large a quantity of the fluid had been removed. The subject of this report, history No. 4,068-15 came under my observation on February 11, 1915, at the German Hospital Dispensary and was four months old. Second child, born at the ninth month, and the birth had been a Cæsarean section. The birth weight was 8½ pounds and the child had been breastfed since birth. The mother had observed that the child's head had gradually been growing larger from birth. On examination measurement of head and body there was observed a marked difference between the circumference of the head and that of the chest. Physical examination showed a normally developed child of four months, but with an exceptionally large head. Its weight was 17 pounds, height, 25¾ inches; circumference of head, 23 inches; circumference of chest, 14½ inches; circumference of abdomen, 14½ inches. There was no rigidity of the arms or legs, but this will be referred to as they later develop. The child was not seen again for four months, when it was admitted to the German Hospital, Children's Department, on June 6, 1915. During these four months the child's head had increased enormously in size, so that the circumference of it now was 31¼ inches, while the measurement of the thorax was 15½ inches. The veins of the head were very prominent, and there was marked separation of all the bones. Eyes were forced downward and slightly inward, so much so that the pupil could not be seen. Lungs and heart were negative, as was the abdomen. Extremities: There was marked spasm of both forearms and legs, they being held in a flexed position; the knee-jerk was markedly exaggerated; there was a permanent Kernig. Weight 32 pounds. Four days after admission the spinal canal was tapped by the usual puncture

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* From the A. Jacobi Division for Children of the German Hospital, New York.

method and only 15 c.c. of clear fluid was obtained and not under pressure. The same day the head was tapped through the anterior fontanel and 3,000 c.c. of clear fluid were removed from the head. This fluid weighed 1¾ pounds per 1,000 c.c., did not reduce sugar, albumin, equals ½ dram per liter. It was alkaline, and had a specific gravity of 1,005. Urea was negative. Circumference of the head the next day was 26¾ inches, and four days later 25⅝ inches. On June 24th the eye grounds were examined by Dr. Rudolph Denig. Both optic nerves in an atrophic state. The apparent downward rolling of the eyeball is due to the pushing forward of the eye and to the stretching of the lids in front of the eye, the latter being due to the tenseness of the skin. On July 9th the circumference of the head was 26 inches. It was again tapped and 1,000 c.c. of yellow-brown fluid was removed. Examination of this fluid was similar to the other fluids. Wassermann on the fluid and blood were negative. Globulin on fluid, negative. Von Pirquet reaction, positive.

Since admission to the hospital the child has been fed on whole milk and water dilution with sugar. The child has gained in weight and the general body condition is very good.

Discussion of Case—From an examination of the history, it will be observed that this case of hydrocephalus is one which began at birth and in all probability was not so much due to the fact that the spinal fluid was secreted in too large a quantity, for if this were the case the head would have filled more rapidly after puncture than it did, but it was due to a lessened absorbing power of the membrane covering the brain and of the spinal cord. Only 15 c.c. of spinal fluid was obtained by lumbar puncture, which would indicate that there was undoubtedly some obstruction in the aqueduct of Sylvius. Of course the exact nature of this obstruction we are not able to determine, as no postmortem examination was available. Child died on August 30, 1915, at the age of nine months.

830 Park Avenue, New York City.

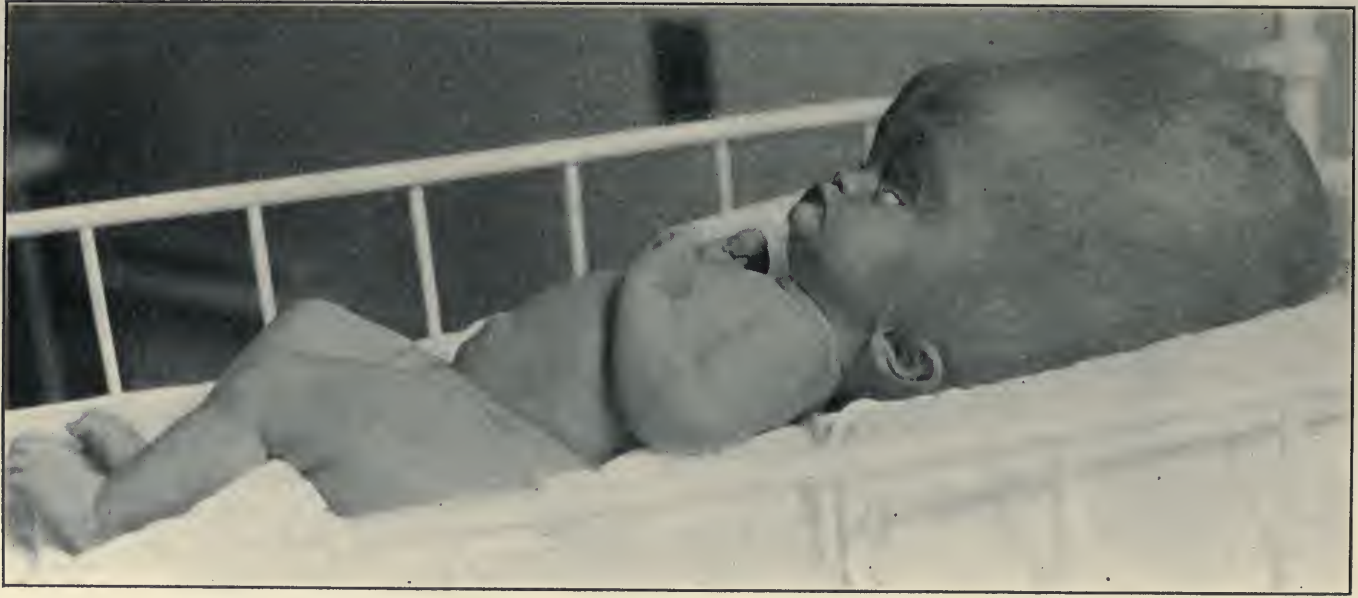

FIG. I. AN UNUSUAL CASE OF HYDROCEPHALUS—Moffett

Cut shows enormous size of head with rolling downward of the eye-ball. Note greatly distended veins of head

SOCIETY REPORTS

THE NEW YORK ACADEMY OF MEDICINE—SECTION ON PEDIATRICS

Stated Meeting, Held April 13, 1916

Royal Storrs Haynes, M.D., in the Chair

MENINGOCOCCUS MENINGITIS WITH UNUSUAL HEMORRHAGIC MANIFESTATIONS

Dr. C. T. Sharpe reported this case by invitation. (See p. 641.)

Dr. Henry Heiman said that this case was extremely interesting and he had never seen anything just like it; never one so severe. If it had occurred during an epidemic one would say that it was a fulminating, one of those severe cases that die within twelve to twenty-four hours. If there had been a number of other similar cases one might say they were due to a particularly virulent strain of meningococcus, but there was only this one case and so it seemed that it could only be explained on the theory that there was a very low degree of resistance in this individual. The disease was of a type in which the blood culture was positive and I do not believe that the injection of serum into the blood would have been effective in this case. The child was lost from the beginning.

THE DEFICIENCIES IN THE STATE LAW REGULATING OVERCROWDING IN INSTITUTIONS FOR INFANTS AND CHILDREN

Dr. Thomas S. Southworth (by request of the Public Health Committee of the Academy) opened this discussion. He said that it was admitted on all sides that the mortality among young infants placed in institutions is much greater than it should be, and greater than if the infants remained at home. This question has caused serious concern, but no very definite suggestions for relief had been forthcoming, save that all such infants should be boarded out. But while boarding out shows results much better than those of the poorest institutions, the results do not notably exceed those of the best institutions. Even if it were desirable, institutions could not be done away with at once. The problem of the institution, therefore, is and must remain a matter of daily and hourly concern, and demands our immediate attention. Superficial changes in the institutional management of infants, while cumulative for better conditions, do not go sufficiently to the root of the matter to be immediately effective. Are there not then some fundamental factors which are now definitely contributory to the mortality, but which can be remedied? Such a factor, in Dr. Southworth's opinion, was the overcrowding in the wards, permitted and endorsed by our present inadequate and loosely drawn State law which, for lack of anything better, is applied to children of very divergent ages, conditions and needs, and is largely robbed of whatever value it might possess by the "joker" clause with which it ends. Chapter XLV. of the Consolidated Laws defines their application as follows: "To every institution in this State, incorporated for the express purpose of receiving or caring for orphan, vagrant or destitute children, or juvenile delinquents, except hospitals." The law goes on to say: "The beds in every dormitory in such institution shall be separated by a passage way of not less than two feet in width, and so arranged that under each the air shall freely circulate, and there shall be adequate ventilation of each bed, and each dormitory shall be furnished with such means of ventilation as the local Board of Health shall prescribe. In every dormitory 600 cubic feet of air space shall be provided and allowed for each bed or occupant, and no more beds or occupants shall be permitted than are thus provided for, unless free and adequate means of ventilation exists approved by the local Board of Health, and a special permit in writing therefor be granted by such a Board." Certainly the terms orphan, vagrant, and destitute children, or juvenile delinquents suggest children of the run-about age of two years or over, and not young infants. This view is confirmed by the use throughout of the term "dormitory," which the Century Dictionary defines as "the part of a boarding-school or other institution where the inmates sleep." The inference is that the law was framed to regulate the sleeping quarters of asylums or reformatory institutions for older children who might be reasonably supposed to spend a considerable part of their time in other quarters during the day. There is no trace of implication that it was intended to be applied to infants or to wards in which more or less sick infants lived practically all the time, both day and night, during a very considerable part of the year. It would appear that it was the intention of the framers that there should be not less than 600 cubic feet per inmate; else why state it so clearly? But this intention was nullified by the final or "joker" clause, which was perhaps appended as a compromise. The "joker" or amendment grants to any local Board of Health in the State the power to issue permits for any larger number of inmates, when consequent reduction in the cubic space per inmate provided for "free and adequate means of ventilation." Such adequate means of ventilation should exist. What then is the practical working of the law in New York City? Framed permits are hung upon the walls of each ward stating the number of infants allowed therein. Permits were until recently granted by the Board of Health based upon the number of square feet of floor space, allowing about fifty square feet, or slightly over, for each inmate of the ward. This has recently been changed to cubic feet, allowing about 500 cubic feet per inmate, and affording at times less than 50 square feet of floor space in certain of the institutions, depending upon the height of the ceilings. He said he had been informed authoritatively that this amount may be and is reduced legally as low as 200 cubic feet per inmate in certain other types of institutions covered by the law, and that there is nothing to prevent a further reduction below 500 cubic feet in wards for infants. Whether the 600 cubic feet of space per inmate, which was the evident intention of the law, or any reduction therefrom, is or is not adequate for the dormitories or sleeping quarters of older and presumably well children in reformatories or orphan asylums, he was not here to discuss, but he did with all earnestness contend that the application of the law, for a lack of a better, to wards containing infants under two years of age, and especially bottle-fed infants under one year of age, with an allowance of only 500 cubic feet and perhaps less than 50 square feet of floor space per infant, tends directly to increase both the morbidity and consequent mortality among such infants, a mortality which, in part at least, is preventable. The origin and authority for the 600 cubic feet standard, now largely departed from in the wrong direction, appears to be lost in obscurity; but judging from the answers received to a questionaire sent to the members of the American Pediatric Society, compiled and published in the ARCHIVES OF PEDIATRICS, September, 1915, such space allowance falls far short of the 1,000 cubic feet demanded by the majority of pediatric opinion throughout the United States. In all, except possibly the most modern and enlightened institutions, bottle-fed infants who remain for any considerable time do not continue to be well-fed infants, even though they are admitted as such. They suffer not only from digestive and nutritional disorders, but from the acute infections which spread readily in overcrowded wards. Owing to the special care which such infants require, not alone when reasonably well, but more particularly when sick, the wards in which they are cared for demand the larger nursing staff and adequate cubic space of sick wards. In whatever type of institution they are situated, they are to all intents and purposes hospital wards, not dormitories. Very few institutions receiving and retaining infants make adequate provision of competent nurses, or increase the number of nurses as the population of a ward increases. Overcrowding means, therefore, a proportionately decreased care of the individual infant, and no one will deny that under-care makes for an increased mortality. Where permits have been issued for an excessive number of infants, but the ward is sparsely filled, the effect of painstaking individualization in the bottle feeding may be to inaugurate satisfactory gains in the weight; but if with such care few or no infants die, continued admissions to the ward soon increase the numbers to the legalized point of overcrowding. Then, with exactly the same methods of feeding, infants who were previously doing well cease to gain; some lose rapidly; and there are a number of deaths until the census of the infants is again reduced. In short, modern feeding methods fail, or avail only temporarily, to prolong the lives of the infants where overcrowding is permitted. With our present knowledge it is scarcely necessary to argue that infections, both of the more subtle respiratory types and of the openly contagious types, are more readily spread by permitting close proximity of the infants' cribs. Any one who has observed the effects upon nutrition of the invasion of the infants' ward by the usual grippal infection will need no argument concerning its resultant mortality. The question may readily be asked: "Why, if this overcrowding so manifestly contributes to the mortality, are not steps taken by the physicians of each institution to reduce the numbers in the wards?" The answer to this is that it is obviously difficult to convince lay managers that the permits issued by recognized authorities concerned with the enforcement of health regulations do not represent the last word in the most enlightened pediatric opinion concerning the needs of the infants. Thus, a law framed with beneficent intent offers not assistance, but an obstacle to efforts to reduce the mortality among those infants. In the application of this law to infants, the recent trend has not been to insist upon more space than the minimum prescribed by the law, but, on the contrary, to allow less space than that contemplated and specified in the law. Those whose only experience has been with infants placed for temporary treatment in the wards of well-appointed hospitals, having 1,000 or more cubic feet of space for each inmate, can form no adequate conception of the problems which present themselves in overcrowded institutions. The basic criteria are not the same, but the better results shown by the former, with their large space, constitute a very potent and cogent argument for the limitation of overcrowding in institutions for infants. Dr. Southworth said they had been asked by the Committee of the Academy of Medicine to review this matter as a Section and from the pediatric standpoint. He suggested that the State law should be revised; that certain sections should be framed for orphan asylums, reformatories, and older children; and separate new sections framed for young children and infants; that provision should be made for ample space in sick wards; that wards containing bottle-fed infants under eighteen months of age should be specifically classed as sick or hospital wards; that the amount of cubic space allowed to each of these main groups should be based upon modern pediatric opinion; and that there should be no qualifying clauses permitting the purport of the law to be nullified to suit individual caprice; that after basic space, which is sufficient with the windows closed, had been specified, further provision may then be made for inspections and enforcement by local authorities, with a view to assuring reasonable employment of the usual available means of ventilation. Dr. Southworth did not claim that additional space was a cure-all which would remedy all the difficulties in rearing infants in institutions, but he maintained that increasing the cubic space requirement was the surest, most direct, and most feasible way of correcting a number of the evils of institutional life. So long as the present inadequate law remains on our statute books, just so long will the unnecessarily large mortality obtain inevitably in our institutions for infants, and especially among those infants under one year of age who are artificially-fed.

Dr. Charles Gilmore Kerley said that the mortality of young children depended on so many other factors in addition to that of cubic air space, that he felt that this was, comparatively speaking, but a small part of the subject. If the air is undergoing active ventilation a small cubic air space may answer very well. The peculiar feature which we meet with in most institutions is that there is but one room for a group of children, and here they must stay all the while; in this one room they must play, eat and sleep, and this is the factor that does not obtain in ordinary dwellings. This is one of the worst factors in connection with institutions for infants and young children.

Another matter was with reference to an adequate system of ventilation. While he would not discuss the various systems of ventilation that we have, he would say that he did not know of a system that really does ventilate; when one wants ventilation he still has to resort to the open window. So while he realized that cubic air space was important, it was rather insignificant if other factors are not taken into consideration.

Dr. Henry Dwight Chapin said that Dr. Kerley had brought out the two points that he would emphasize. We may have 1,000 or 10,000 cubic feet of air space, and if everything is shut up the supply of air may be insufficient; the essential factor is to have an adequate supply of freely-moving fresh air and then the cubic air space is not so important. Last summer he had visited one institution in Portland, Ore., where they were having a very low mortality and yet everything in connection with the air space and ventilation was wrong. There was, however, a wide piazza and the children were out in the fresh air all day, and this was probably a factor in the low mortality under what were otherwise very bad conditions. It seems that the best way of dealing with institutions for infants is to abolish them as far as possible. It has been said that lay boards make the rules and doctors follow them. The doctors should say that if conditions were not improved they would no longer remain on the staffs of such institutions. We may as well recognize the fact that the trouble lies in a lack of proper force on the part of the doctor.

Dr. Floyd M. Crandall said that this question had been brought before them for very definite reasons, particularly for opinions with reference to accommodations for infants and children in institutions as measured by cubic air space. It was with this object in view that this question had been referred to this section for an expression of opinion. That was what the discussion should bring out. The question has come up whether the Public Health Committee of the Academy of Medicine should take up the modifying of this law. The question should be considered by pediatricians first and the doctors who discuss it should bring out something definite and tangible. It is an inadequate law in that it lodges the decision in the matter of overcrowding in the hands of the managers of institutions and so long as they are protected by the law, as they now are, they are not liable to be more liberal than the law requires.

On the suggestion of the chairman the Section voted in favor of a motion providing for the appointment of a committee which should submit a questionnaire to the members of the Section, since this would be the best method of getting the desired information on this subject.

THE HOSPITAL CONTROL OF THE INFECTIOUS DISEASES OF INFANCY AND CHILDHOOD

Dr. Dennett L. Richardson, Superintendent of the Providence City Hospital, read this paper by invitation. He said that present-day investigations of infectious diseases were most interesting and valuable, that this was a promising field of endeavor which would yield new truths, the scientific application of which would greatly diminish human suffering and loss of life. These studies should embrace statistical data, accurate clinical observation, and clinical research. The problems to be solved are the etiology, the determination of the secretions and excretions in which the virus exists, the earliest and latest periods of infectivity, the fate of the virus after it leaves the body, the natural modes of transmission, the atrium of infection, and the exact and early means of diagnosis, and, finally, the treatment. It is pretty well established that the sources of any infectious diseases are three—the clinical case, the missed case and the carrier. The disputed questions relate to the methods by which the virus finds its way into the healthy person. Formerly the rôle of air infection was given more attention than the avoidance of infection by contact, but through the observations of certain French investigators, the conclusion has been reached that the diseases in question are seldom air borne and that isolation of the patient is not complete unless rigid antisepsis is carried out. The practical results obtained at the Pasteur and several other French hospitals have shown that with the employment of aseptic nursing it is no longer necessary to house different diseases in separate pavilions. In consequence of this there have developed several methods of construction by which one may obtain physical separation of patients suffering from different infectious diseases and yet treat them in the same ward. These systems are: (1) The cubicle system, having its origin in the Pasteur Hospital and consisting of single rooms, the partitions being complete or only partially reaching to the ceiling and arranged on both sides of a common corridor. (2) The barrier system, consisting of bed isolation of different diseases in a large open ward, the beds being placed about twelve feet apart on centers. These isolated beds are designated by colored tape stretched between two uprights at the foot of the bed or by the use of printed colored cards. A few hospitals separate patients in large wards by low, glass partitions between the beds, as at the Willard Parker and Johns Hopkins. (3) The cellular block plan as constructed at the Plaistow Hospital consists of two rows of rooms back to back, with glass partitions between them, each room leading to an open veranda on either side of the building. The statistical records of London hospitals into which these systems were introduced demonstrated the success of aseptic nursing, but showed that measles and chickenpox were the most difficult to care for by aseptic nursing.

In March, 1910, aseptic nursing was first undertaken at the Providence City Hospital, which had been constructed in accordance with the theories of medical asepsis through the efforts of Dr. Charles V. Chapin, Superintendent of Health of Providence. Patients suffering from infectious diseases are accommodated in three two-story pavilions, arranged in parallel manner, and containing about 140 beds. Two of the buildings are duplicates; each floor of these pavilions is so arranged that about half the patients can be placed in rooms off the central corridor and containing from one to three beds each, while there is a convalescent ward with fourteen beds at the south end of the building. At present one of the duplicate buildings is devoted to scarlet fever. The first floor of the other building houses the diphtheria patients; the second floor is used for an isolation ward, where various infectious diseases, except measles and chickenpox, are treated. These highly transmissible diseases are not included, because the nursing in these buildings is largely done by pupil nurses, who have had only two months' training in technique. The third building, the so-called isolation building, provides for the care of any infectious disease, including smallpox. Every room is provided with a lavatory, where the water must be turned on by forearm or foot levers and where nurses and physicians must wash contaminated hands in running water with soap and scrub brush. Immersion in an antiseptic solution is also required after such diseases as measles, chickenpox and smallpox, and very septic cases of other infectious diseases.

Elaborate construction alone is quite unable to prevent cross-infection. Proper management is of far greater importance. The latter resolves itself into proper admission of patients to prevent mistakes of diagnosis, securing a history of other infectious diseases in the home, active and intelligent observation of patients for symptoms of secondary disease, careful attention to the health of all employees, absolute separation of patients suffering from different diseases, and the proper and efficient sterilization of hands, utensils and linen between different infectious units. At the time of admission all doubtful cases are isolated until the diagnosis is clear. Nurses must be impressed with the importance of asepsis and taught the details of its administration. A nurse is taught that the room occupied by a patient is an infected area and under no condition shall she touch, or allow her clothing to touch, anything in such a room unless she has her gown on. Everything taken from such a room must be properly sterilized. The nurse herself must scrub her hands thoroughly for at least three minutes on leaving. She must see that patients in different units never come into direct or indirect contact. When a patient is ready for discharge he is given a soap and water bath and shampoo. This bath is given the day before discharge, and the patient is then put into a clean room set aside in each ward as a discharging room. When the mother comes for the child, clean clothes are put on him and if he presents no symptoms after careful examination he is taken away. The rooms have never been fumigated since the opening of the hospital, but the floors and furniture, and in the isolation wards the walls within easy reach, are washed with soap and water. A careful record has been kept of the room or rooms occupied by each patient, and we have never been able to trace any cross-infection to this source. Infected linen is collected under aseptic precautions and placed directly into washers, where it is washed by boiling water and its sterility tested by cultural experiment. No sterilizing washers are used.

All the elaborate technique of caring for the patient must be supplemented by careful supervision of the nurses, lest a sick nurse be on duty. The same supervision applies to all the hospital personnel. Resident physicians wear white suits. Over their shirts they wear a short-sleeved, washable vest, outside of which is worn the usual white coat. When visiting patients the coat is removed and a gown is worn only when making careful physical examinations. The doctor always scrubs his hands in going from one infectious disease to another.

From March 1, 1910, to January 1, 1916, 6,748 patients have been discharged from the hospital, and among these there occurred 166 cross-infections. The diseases contracted were as follows: Measles, 48; chickenpox, 78; scarlet fever, 19; diphtheria, 10; rubella, 4; whooping-cough, 4; mumps, 3. The total incidence for the whole hospital was 2.4 per cent. If, from the total number of discharges, 2,029 adult patients suffering from tuberculosis and syphilis were subtracted, leaving 4,689, nearly all of whom were children, the incidence is 3.5 per cent. There has never been a cross-infection among the tuberculous and syphilitic patients. In the isolation wards, where a great variety of infectious diseases were treated, 2,788 patients were treated and 92 cross-infections developed, an incidence of 3.3 per cent., slightly less than for the whole hospital, exclusive of tuberculous and syphilitic patients.

Nearly all instances of infectious diseases arising among employees have occurred among pupil nurses. It was interesting to note that 9 nurses were diphtheria carriers when they entered upon their duties, while only 9 were found to be carriers when they had finished their course. Of 424 nurses, 64 had previously had diphtheria, and 19 pupils and 1 graduate contracted the disease; 121 had previously had scarlet fever and 19 pupils and 1 graduate contracted the disease; 335 had previously had measles and none contracted it; 50 had previously had rubella and 2 pupils and 2 graduates developed the disease; 184 had had mumps and only 2 contracted this disease. Among 229 employees during the same period only 5 contracted an infectious disease.

These results demonstrate that rigid asepsis is of primary importance. Hospitals for infectious diseases and for children should not have wards of over six to ten beds each and should have sufficient smaller units to accommodate all patients for an observation period. Conservative and accurate diagnosis on the admission of patients and careful supervision will prevent the entrance or continued residence in the same unit of patients suffering from more than one transmissible infectious disease. Among 42 house officers serving during this period, 2 have developed diphtheria and 1 both mumps and rubella.

Dr. George Draper discussed the hospital care of poliomyelitis. He said that a most notable feature with reference to Dr. Richardson's paper was that no mention was made of poliomyelitis. There were two reasons why there were so few cases of poliomyelitis in this great institution: First, poliomyelitis had essentially a rural distribution, and, secondly, sporadic cases in the city usually came into the large general hospital. The care of poliomyelitis in such a hospital as Dr. Richardson had described was a simple problem. The management of this disease was essentially the same as that of scarlet fever and diphtheria; perhaps particular stress should be laid upon caring for secreta and excreta. There had been a number of instances of cross-infection recorded in Sweden, and among nurses a number of cases had been reported in Europe and America. Their protection, as far as our present knowledge went, depended upon rigid care of the hands, nasal passages and mouth. The control of the disease in hospitals must be similar to that of other diseases; possibly in addition there should be a special care of the nose and throat of contacts. The attendants should use a spray of peroxide solution, or of menthol in oil. Quarantine was at present our best defence in the control of the disease in the community. While most of the means of transmission of poliomyelitis had been determined, some apparently still remained hidden. It had not yet been determined why one infant in a family contracted the disease and not others in the same family; why some sections of a community had a number of cases and others not, and why at another time it would be found in that section of the community which before was free. The part played by abortive cases and healthy carriers must still be cleared up. Contacts must be thoroughly controlled and likewise the carriers and the patients, and the same rigid quarantine must be maintained as in other infectious diseases, though it had not been definitely demonstrated that the virus found in the nose and throat of healthy carriers transmitted the disease. The duration of the activity of the virus in convalescent patients was important. A case had been reported of a child having two attacks of the disease two years apart, and five months after the second attack it still harbored the virus. In monkeys the virus usually disappeared in five or six weeks, but in certain individual monkeys it might persist four or five months. The incubation period of poliomyelitis was normally two to seven days, but there might be a very long latent period, as in one case which had been recorded of a young woman who was committed to prison and who developed poliomyelitis two months after her admission to solitary confinement.

Dr. Henry Heiman spoke of the epidemiology of meningococcus meningitis. He said that the epidemiology of meningococcus meningitis presented features at times so strange and puzzling and so different from the characteristics usually associated with other contagious diseases that its contagiousness had been questioned by not a few observers. As a rule, there was no regular progression or extension of the disease. It moved by leaps and bounds and struck haphazard. In considering the hospital control of infectious diseases from the standpoint of meningococcus meningitis, it was advisable to consider first the mode of transmission of the disease. It was well known that the disease was a communicable one and that it occurred in epidemics. It was also endemic in New York, as were most of the other communicable diseases. It was generally conceded that the mode of transmission was by means of Flügge's droplet infection; that was that the meningococcus was transmitted to the exposed mucous membranes of previously healthy persons. Meningitis might or might not be the result of this transmission, depending upon the susceptibility or resistance of the individual. A study of the natural history of the meningococcus made it improbable that the disease was transmissible through the agency of the atmosphere or of lifeless objects, but from one individual to another. This did not necessarily mean from patient to patient, but it did mean that in most cases the source of contagion was a healthy, or apparently healthy, meningococcus carrier. Experiments had shown that there were from ten to twenty times as many healthy carriers as there were diseased carriers or patients. Therefore, in order to properly control the spread of meningococcus meningitis, we must devote our attention to prophylactic measures. In hospitals these measures were preeminently the gown, the hand brush, and disinfectants; and it would seem rational to add the usual measures, the gargle, and the cleansing of the nasopharynx of the physician, the nurse, or of anyone coming in contact with the patient. The disinfection of all the excreta of the patient, especially those of the respiratory tract, was of the utmost importance. Experience had shown that absolute quarantine in a hospital was not necessary, as transmission of the disease in hospitals was comparatively rare; however, the infection of nurses attending cases had been reported. School infections, though rare, had been reported by Bolduan and Goodwin and Netter and Debrè. The latter observed 10 cases, 6 of which attended a common school. Among 231 pupils in this school, 40 were found to be meningococcus carriers, that was, 21.21 per cent. Flügge reports that 70 per cent. of those living in close proximity to a meningitis patient became carriers. Netter and Debrè found 41.66 per cent. of those coming in contact with patients having meningitis became carriers during the months of March, April and May, while during June, July and August only 26.66 became carriers. It would not be amiss to have occasional cultures of the nasopharynx taken from doctors and nurses attending cases of meningitis. Overcrowding in hospitals during an epidemic of meningitis should be avoided. The advisability of sending meningococcus meningitis cases to the hospital should be urged upon the public, not only for the sake of preventing the spread of the disease, but for better observation and better control of the disease by laboratory methods. If patients remain at home, they should be isolated, and intermingling between members of the family and the outside world restricted as much as possible. Children belonging to the family of the patient should not be permitted to attend school for about three weeks from the onset of the disease, unless they could be proved by bacteriologic methods to be non-carriers. In concluding, Dr. Heiman emphasized the importance of the healthy carrier in the transmission of meningococcus meningitis and said that attention should be directed to these almost as much as to the patients themselves. Prophylactic measures directed along these lines would probably help to lessen the dissemination of this disease.

Dr. William H. Park discussed the hospital control of diphtheria. He said that in the first place it was interesting to observe how they had received a paper like Dr. Richardson's. Five or ten years ago they would have thought that a method such as had been described was not effective quarantine. We would have thought that caring for two kinds of infectious diseases with only a partition open at the top between them would not prevent transmission.

As to diphtheria and the Schick test, Dr. Park said that a negative Schick test was absolute evidence that an individual is immune to diphtheria, except in very young children. In these one cannot rely upon the test. For instance, Dr. Hess had one baby which gave a negative Schick reaction and three months after developed diphtheria. This might be explained by the fact that in early infancy the baby still had the mother's immunity. In adults it was different and in them a negative Schick might be absolutely depended upon.

Dr. Park said they had had their views with reference to active immunization changed; they had found that about 90 per cent. who were given immunizing doses of toxin-antitoxin did not develop antitoxin for some weeks, so that in hospitals the production of active immunization was of only practical value for physicians and nurses, but for the protection of patients we must still rely upon passive immunity.

Up to the present time nothing had been discovered that was effective in the treatment of diphtheria carriers. It has been shown that a careful antiseptic toilet of the nose and throat simply covers up the bacilli and after a few days without treatment they show themselves again. The only measure that seems to be effective is the removal of the tonsils.

The production of active immunity to diphtheria has a wide field of usefulness. Active immunity had already been conferred on 10,000 children in institutions in this city and it was hoped that they would soon be able to take up the health centers and try to protect as many children as possible.

Dr. Park asked Dr. Richardson if he would separate all the different contagious diseases if he had the facilities, rather than put them in the same ward, where it was necessary to carry out this rigid asepsis.

Dr. Bertram H. Waters said it was rather difficult to discuss the subject of whooping-cough in relation to hospital control, since so few cases of whooping-cough are sent to the hospital. It is estimated that only about 50 per cent. of the cases of whooping-cough are reported and only a very few of these come under the control of the hospital. Whooping-cough presents a rather difficult problem, as we are all aware, and the Department of

Health does not supervise whooping-cough cases because of the difficulty of obtaining early reports and since the period of greatest infectivity of the disease is that before a diagnosis can be made and also because of lack of funds and men to carry out such work, these being all needed to look after the more severe forms of contagious disease. A question that is being considered at the present time is whether it would not be advisable to require a two weeks' quarantine for whooping-cough that would cover the first week and aid in controlling the infection during the second week. Such a plan would require at least one visit by a representative of the Health Department.

I feel that we have had very promising results in immunity from the use of the vaccine, as shown by the very interesting work of Dr. Park and Dr. Hess.

Dr. Alfred F. Hess, in discussing the hospital control of measles, said that the hospital control of measles was particularly interesting, because the mortality of measles in hospitals is so different from the mortality in the homes. In the community the mortality from measles is rather low, while in Willard Parker Hospital there is a mortality from this disease of 15 to 20 per cent. A statement like this might appear a rather severe arraignment of the hospital, but further investigation has shown that the hospital is not so much to blame for this high mortality. We find that about one-third of the hospital cases of measles are under two years of age. In the last three months, of 319 cases, 112 were under two years of age, which falls far below the age incidence in the community. Again, the mortality from measles is almost entirely due to pneumonia. During March there were 25 deaths due to pneumonia; 21 of these cases of pneumonia were admitted to the hospital with the disease and 4 developed it in the institution. In February there were 17 cases of pneumonia admitted and 2 developed the disease after admission to the hospital. The high mortality from measles and pneumonia in contagious disease hospitals is largely due to the fact that they receive the very severe cases and that the very severe cases are transferred to hospitals from homes and institutions. Out of 56 children that died, 21 came not from homes, but from other institutions. It is, however, a recognized fact that we have a higher mortality from measles in orphan asylums and foundling homes than in private homes.

There is no specific treatment for measles and pneumonia.

It seems that, such being the case, it is advisable to direct our treatment to the pneumonia and give the patient the treatment for this disease. We have always been afraid of fresh air for cases of measles and have shut these patients up, but when measles is complicated with pneumonia it will be well to make an exception and give the patient the benefit of fresh air. Furthermore, unless it is absolutely necessary, we ought not to have any case of measles under two years of age sent to the hospital, but should keep these infants under two years of age at home. In a recent investigation of the cases coming to Willard Parker Hospital we found that medical inspectors had been sending these cases to the hospital. We had one instance of a child that developed measles in an institution and instead of sending for the mother of the child and having her take the child home, he was sent to the hospital. A mother would be willing to care for such a child, especially would she be willing if she was told that children with measles did better at home than in a hospital. If the community were instructed in this way in regard to the mortality from measles in the contagious and other hospitals we could get their co-operation in keeping these young children out of the hospitals and thus lessening the mortality from this disease.

Dr. Haven Emerson said that New York, as well as the rest of the country, was indebted to our teachers from Providence. The fact that the New York Department of Health had abandoned fumigation might be attributed to the teachings of Dr. Chapin. In their new hospitals for infectious diseases they had practically followed out his plans of construction with very slight modifications. When it came to confining infection to the individual we must establish the same teaching among medical nurses that we had been emphasizing in the training of surgical nurses; that was, they must be taught aseptic technic. If this were possible, there was no reason why these diseases could not be treated in a department of a general hospital. If this could be done it would effect a great economy, since it cost a great deal to keep up a large number of beds simply on the possibility that they might be needed at certain seasons. It would be a great economy if we could use these beds all the year around, and this could be done by absorbing the acute infectious diseases of childhood during the season when they were most prevalent, and then caring for chronic cases, such as tuberculosis and syphilis, when the acute infectious diseases were less prevalent. Dr. Emerson also emphasized the desirability of having physicians teach the people to keep children under two years of age with measles at home. He said it was really a question whether they ought to be admitted under any conditions, certainly only when the home conditions were such that it was absolutely impossible to give them the first elements of decent care. There would always be a need, however, for some hospital that would care for measles in New York City. There was also the question of the advisability of admitting cases of whooping-cough (and they would make every effort to admit these cases) when they occurred in a family in which there was a child under two years of age who would be exposed to the infection. Dr. Emerson also suggested that it might be proper to provide hospital care for cases of favus and ringworm, since a number of children lost a great deal of time from school on account of these conditions.

Dr. Dennett H. Richardson, of Providence, in closing the discussion, said that from what Dr. Park had said it seemed that their work was more or less misunderstood. They had a ward for scarlet fever and one for diphtheria, into which they had introduced other diseases occasionally. They also had three isolation wards for various infectious diseases. The plan of admission which they carried out was a process of filtration, keeping all the new patients in small units for a one-week period of observation. Their plan meant more to the small town or the small city that could not afford to have a hospital for each infectious disease. In a small city, where there was a necessity for economy, this plan could be carried out if one knew the underlying principle, that was, that contact infection, infected human beings, and not environment, was the source of infection, and if we could control the contacts, the mild cases and the clinical cases we could have much better control of infectious diseases.

Dr. Haynes asked Dr. Richardson how his statistics with reference to cross-infection compared with those of other hospitals.

Dr. Richardson replied that few American hospitals had published reports on that point. The only one he knew of was Dr. Auker, of the St. Paul County Hospital; he gave the number of cross-infections and the number of cases of infectious disease among employees and nurses. This was the only report beside that of the Providence City Hospital in this country that gave this data, but some of the foreign reports showed that for scarlet fever and diphtheria the number of cross-infections had been as high as 7 per cent.

Dr. Kerley asked Dr. Richardson if he had had any experience with reference to the incubation period of scarlet fever.

Dr. Richardson replied that the shortest incubation period he had known was thirty-six hours, and as to the other limit he did not think anyone knew. If a child came into the hospital with scarlet fever, and if at the end of four weeks it was necessary to detain him for a day or two, and then another child came in from the same family one could not say whether he was infected by some other child at home, a mild case that had escaped detection, or whether the incubation period had been long, that patient having been infected by the hospital patient admitted four weeks before. Had the hospital case returned home the second case would have been looked upon as a return case.

Mongolian Idiocy and Syphilis—The etiology of Mongolian idiocy is unknown. One of the suggested causes is parental syphilis. H. C. Stevens (Journal of American Medical Association, 1915, Vol. LXIV., p. 1,636) has examined the spinal fluid of 20 Mongols. The Wassermann reaction on the blood serum of Mongolian idiots was positive in 10 per cent. of the cases. The Wassermann reaction on the spinal fluid was undoubtedly positive in 25 per cent. of the cases. The Wassermann reaction on two fluids was doubtful. The gold chlorid reactions on these two fluids did not show typical luetic changes. Pleocytosis was present in 20 per cent. of the cases. The globulin content was increased in 90 per cent. of the cases. The gold chlorid reaction showed color changes of two or more degrees in 90 per cent. of the cases. The color changes of the gold chlorid are in the luetic zone. The father of 2 of the cases is kiown to have syphilis at present. This infection was acquired before his marriage. One child born dead preceded the 2 Mongolian children. The only abnormality in the spinal fluid of the children is the pleocytosis and the questionable Lange reaction in 1 case. The globulin content and the gold chlorid reaction parallel each other.—*The American Journal of Obstetrics.*

THE PHILADELPHIA PEDIATRIC SOCIETY

Stated Meeting, Held April 11, 1916

PRESIDENT JOHN F. SINCLAIR, M.D., IN THE CHAIR

DR. J. T. RUGH, in showing Siamese twins, said: "Three months ago a doctor near Philadelphia was called to attend a mother in labor from her third pregnancy. The other two labors had been normal and the children normal. However, in the family there was a history that on the maternal side every female member for three generations who had borne several children had had one child that was defective in some respect. To make a long story short, after considerable difficulty the woman was delivered of Siamese twins. The twins had been brought to Philadelphia with the idea of trying to make them grow and to reach a condition in which they could be operated upon. Extensive investigations had been made on these children and it was found that each child had its own gastrointestinal system which was entirely distinct from the other child's. They seemed to have, however, a common liver. In one experiment, one of these children had been given methylene blue by mouth and both children had passed blue urine. Collectively the children had weighed 9½ pounds at birth, the greatest weight being 10 pounds and 2 ounces. They had no trouble with their gastrointestinal system and had been able to digest the food given them, which was a 3–6–1½ mixture. At the present time their circulation is beginning to show evidence of failure and it did not look as though they would live. The children were connected from the middle of the sternum to the middle abdomen, the umbilicus being underneath the band of union."

SYMPOSIUM ON THE TEACHING OF INFANT FEEDING

DR. J. P. CROZER GRIFFITH said that the experience of a good many years of teaching pediatrics at the University of Pennsylvania enabled him to look back over the developments which have taken place in our knowledge of the subject during these years. He has tried to keep pace with these developments in his teaching. When he first commenced to lecture on the subject, twenty-five years ago, the pasteurizing of milk was just coming into vogue. About the same time, too, the first systematic continued effort was made towards the selection of a milk which could be called clean. He has always taught the importance of this, and believes still in the value of pasteurizing for any questionable milk, or even for the best of milk during hot weather. It is important, too, to get milk of fairly uniform strength, since without this we can have no uniform results. The belief in the importance of clean milk and of uniform milk has spread very widely throughout the country during the years which have passed.

With regard to percentage feeding, Dr. Rotch first brought out the necessity of thinking in percentages instead of in quantities. The idea was taken up rapidly by the profession in this country, and, although it apparently did not receive the recognition in Germany and France which it did here, that the percentage method was actually employed is shown by the fact that the very numerous special milk formulæ, recommended by and often manufactured under the supervision of physicians, were, and still are, constructed upon the percentage basis.

A few years ago the so-called "caloric method" of infant feeding came into prominence. Dr. Griffith has adopted and taught this with certain very decided restrictions. He believes that this method is only serviceable for checking up the percentage method. First of all, we do not know what a normal child really needs in the way of calories, inasmuch as investigators vary upon this point. This applies with still greater force to children whose digestion has suffered, and whose weight does not correspond to their age and their size. The caloric method was based upon the weight of the child, but investigation has shown that it is not so much the weight, but the body surface which should determine the heat dissipation and the consequent number of calories which the food should contain to replace this. Further, the activity of the child has a great deal to do with the number of heat-units needed; whether it is asleep or awake; whether it is healthily active or is abnormally quiet, as so many marantic children are.

Another comparatively recent idea in infant feeding is that it is not so much the bacterial contamination which plays a part in the production of imperfect nutrition as it is chemical changes in the food in the intestines, or, perhaps still more, disturbed metabolic processes. There is undoubtedly a great deal of truth in this; but many of us find it difficult to believe that bacteria play so small a rôle as is assigned to them in some quarters.

Another observation which in recent years has been making with reason a continually increasing impression upon pediatrists, is the fact that the various elements of the food do not act separately, but in unison. Some elements can be tolerated or not tolerated if certain other elements are withdrawn. For instance, Finkelstein advanced the belief that a child can stand a high casein-percentage provided you withdraw the whey with the sugar and the salts contained in it; and that fat, too, may be added to the food, provided the whey is withdrawn. So, too, it has been maintained with reason that malt soup, in which the carbohydrate percentage is very high, renders the fat percentage better tolerated, probably through the presence of a large amount of insoluble carbohydrate. In other instances it has been found that protein decomposition can be checked by the presence of a high carbohydrate percentage in the food.

For a good many years Dr. Griffith has tried to emphasize the importance of considering the individuality of the child. This seems a simple matter, yet is one which is frequently disregarded. We cannot formulate any rule or method of feeding an infant, because other infants of the same age could tolerate a certain food. In fact, we cannot feed at all according to the age of the child.

This brings us to the last "new" idea in the matter of infant feeding, viz.:—the so-called simple dilution method. This was probably based upon Heubner's recommendation in his caloric method, that we should use simple dilutions of whole milk of different strengths, to which sugar was added in the proportions desired. Many of those, however, who have supposedly followed this method have abandoned in reality the methods of their teacher. The simple dilution method as recommended by many is supposed to be a way to avoid all calculations of percentages, on the ground that these calculations are difficult and impossible to be carried out by the average physician. It is called an easy method. Dr. Griffith wished to call the attention of the members to the fact that Heubner not only first calculated the percentages of the different milk ingredients present in the dilutions employed, but went further and calculated the caloric values of these percentages, in order to see whether the food reachd the caloric needs of the child. There is certainly nothing easy about this. In fact there is nothing we can do which will make infant feeding easy. Those who want to make it easy had better resign the problem to those who are willing to take any trouble required to find the best food possible. Artificial feeding is the hardest problem that pediatrists have to encounter. As to any difficulty applying to the percentage method as embodied in the employment of top milk, no physician of average intelligence surely can find the dilution of, for instance, the upper 24 ounces of a quart of milk with a certain amount of water any more difficult for himself to recommend, or for the mother to carry out under his directions, than is the dilution of whole milk with the same amount of water; and just as soon as we begin to employ skimmed milk as a diluent for simple dilutions, we are, in fact, involuntarily thinking and working in percentages. The simple dilution method is all right for those who will take the trouble to really think out the kind and amount of the elements of the food which they are giving to the children; but in the hands of those who merely want to avoid trouble, its employment is a menace to the patient. It is simply retrograding to where the profession was more than twenty-five years ago.

Dr. Edwin E. Graham, in speaking of the method of teaching infant feeding at the Jefferson Medical College, made the following remarks: The problem of teaching an under graduate infant feeding is not easy. It is not an interesting subject to the under graduate.

The Pediatric Department of the Jefferson Medical College consists of a professor, two associates and six instructors. The department controls all the pediatric material in the Jefferson. The first social worker that was instituted at the Jefferson was given to the Pediatric Department. A little over a hundred hours are set aside for the teaching of pediatrics. The members of the Pediatric Department meet at the beginning of each year and discuss the teaching of the previous year and how it may be modified and improved upon.

In the Junior year the theory of infant feeding is taught. The class is divided into sections of twelve each. These students have had no previous instruction on the subject. They are first told about the food materials, bacteria, the preservation of milk and the way it should be cared for. The peptonization and sterilization of milk are taught. The problems of condensed milk are enlarged upon and the importance of breast feeding. The student is taught how often a child should be nursed and what amount it should receive. Other problems such as those about wet nurses and the anatomy and function of the mammary glands are impressed upon the student.

Dr. Graham brought out the point that in his teaching he insists upon thinking in percentages. He believes that the home modification of milk is a simple thing and any mother of moderate intelligence can carry it out. He thinks the student should be taught how to make milk mixtures so that he himself may instruct the mother. Students should be taught in a cold-blooded way how the average normal child is to be fed, so that they may have a definite idea and a basis to work on.

In the Senior year the work consists of a series of clinics. They have previously arranged their material so that different subjects, such as diarrhea, acute gastroenteritis and diseases of this nature may be systematically presented before the class.

Dr. Joseph H. McKee talked on the method of teaching infant feeding at the Medico-Chirurgical Hospital.

Every virtuoso of recent years seems to have devised some different arrangement of the feeding score; everyone some variation of the tempo. Again, in the memories of many of us, the main motif has swung from caseins in crescendo to volatile fatty acids in fortissimo, and now back to pianissimo and that dulcet sweetness which must perforce precede the crash of metabolic explosion or the stealthy march of villainous bacteria. Is it any wonder that through it all the novice perceives no harmony of sweet sounds; but only a musical jargon, from which emerges proteins, fats, sugars, calories and percentages, intoxications and infections in almost meaningless dissonance. Worse than all this, the artist himself, who, despite special knowledge and trained technic, has arrived at few finalities of treatment, actually scolds his patient auditors for not knowing that changes have taken place since he last performed.

Logically and ethically infant feeding represents the heaviest responsibility that devolves upon the pediatrician or the general practitioner of medicine. This statement has been proved so often and is so susceptible of proof that I shall simply assume that this audience accepts it. Year by year increasing numbers of earnest students are showing an interest in pediatrics and are expressing a desire to devote their medical careers to this work. This being the case, every pediatric department in a teaching institution should be splendidly equipped to perform its principal mission.

Such equipments have not been perfected; but the vision falls far short of the modern ideal that does not include a full professor; at least two adjunct or associate professors, one of whom shall be an extra-mural teacher; a bright and well-ventilated ward; a solarium and an open-air porch; an isolation room or ward; a well-equipped milk room; an ideal milk supply; reliable scales; a metabolism bed; a close inter-relationship with the obstetrical department; a well-equipped dispensary and a well-organized dispensary staff; an efficient social service and well-equipped laboratories for the examination of milk, urine, stools, blood and for Roentgenologic and bacteriologic diagnosis.

The head of such a department should be a real specialist and should confine his work to the treatment of sick infants and children and to the prevention of disease in early life. Some of our greatest pediatricians have been general practitioners; but of recent years the pediatric acreage has increased so enormously that the busy man can scarcely survey its acquisitions whilst behind him roll many well-tilled fields. Research should be stimulated among both staff and students, and fortunate indeed is the institution in which ample endowment provides for research and investigation.

The best food for the baby is mother's milk, or, at least, human milk. The advantages possessed by it when compared to any other infant nutriment should be written in indelible characters for the student. To it as a model he should be taught to look; from it as an ideal food he should be taught to work. From it he should learn the metabolic importance of the organic constituents of milk, and some of the more recent knowledge concerning the actions of its salts. If breast feeding is best, then the actual management of breast feeding should be made clear to students. Again, the reasons for disturbances in lactation or for actual failure in breast feeding should be taught in our medical colleges. Weaning and wet-nursing should receive ample attention before the student deserts the problems of breast feeding.

Hand or Bottle Feeding—When breasts go dry, and babies are left to these mere devices of men, there seems to be a perfect unanimity of opinion concerning the principal objects to be obtained. One of these is to secure a clean food, elimination of, or at least lessening the chance of infection; and the other is to adapt a food, as little removed from nature as possible, to the individual baby's digestive powers and his nutritive needs. In both efforts, breast milk constitutes our model.

If called upon to treat a disturbed baby, a difficult feeding case, history taking and physical examinations and laboratory investigations must become intensive. There is here no royal road to success. We should seek to learn whether all of the organic constituents have been given in excess or whether proteins, fats or carbohydrates are the principal or sole causes of the disturbances. Again, we should strive to ascertain whether or not infections have played causative rôles, and, if so, first attention should be given to the gas bacillus or to the bacillus dysenteriæ.

In the presence of a difficult feeding case, an initial purge followed by a starvation or water day, should precede any actual attempts at feeding. The actual feeding effort, when made, should be directed primarily toward tranquillizing a disturbed prima-via. Initial weight loss, or at least a failure to gain, should be viewed as of wholly secondary importance. If milk is employed in these early days of treatment, one should begin by "thinking low." It is very easy to aim higher when the stomach and bowel are functionating properly and the baby becomes hungry. Again, we perform only a partial office, when "we bring the formula down to the baby." It is necessary that we should enter into and direct every hygienic detail of the infant's life, so that we may bring him up to his formula.

It should never be forgotten that nutritional disorders may also arise when certain organic elements of food are given in too small quantities. Proteins are true tissue builders and they are always needed by the infant economy. One should never be satisfied with a milk formula that contains less than 1 per cent. Freshness of food is another important consideration.

This paper, though all too long, has but touched, in a more or less sketchy manner, upon important principles that every medical student should make his own. Finally, though we desire him to come in intimate contact with patients, with infant food and with the application of feeding principles, it still seems necessary to teach certain subjects in a systematized, didactic course. Started with principles and with co-ordinated working theories, the present requirement of a hospital year should serve to equip the young doctor for service—a service truly in which "a little child shall lead him."

Dr. Theodore Le Boutillier: It is exceedingly difficult to discuss these three papers, as they have taken up almost every phase of the subject. I would like, however, to give a short outline of the methods employed in teaching infant feeding at the Woman's Medical College of Pennsylvania.

The teaching of pediatrics is begun in the third year, and one of the first subjects taken up is infant feeding. The importance of breast feeding is emphasized and when breast feeding does not agree the various methods of improving the maternal milk supply are carefully discussed. Students are taught that part breast and part modified milk feeding is better than the sudden change to entirely artificial feeding.

The modification of milk is next taken up, first of all showing the importance of clean milk. In this connection the various infections that may be carried in milk are explained, also the importance of the use of certified milk, the care of the milk in the home, and the preparation of milk, emphasizing the need for absolute cleanliness of utensils. The technique of making the milk mixture is also shown. We believe that home modification of milk is better than laboratory modification because the latter is so accurate that the infant's digestive tract does not become accustomed to the slight variations which occur in the mixtures from day to day when they are put up in the home. Breast milk shows variations not only from day to day, but from feeding to feeding, and, besides, which we have found that every mother is capable of making the mixture in her own home if she is carefully taught. In making up the mixtures, whole milk, fat-free milk and cream are used. In the third year the students also work in the dispensaries.

In the fourth year the work is continued in the wards. Here the students have charge of the babies under the direction of the chief of the department and the resident physician. They study the child, examine stools and at times go into the milk room and see the mixture prepared or prepare it themselves. Every doctor should be able to go into the home and show the mother how to make up the mixture. All students must study the stools frequently and examine the weight chart. We try to make the modification of milk a simple problem and for this reason have given up much of the algebraic part of it.

The importance of infant feeding cannot be exaggerated. It is a most difficult subject and one where every individual child must be a law in itself.

Dr. H. Brooker Mills commented on the fact that applicants for hospital and State Board examinations were sometimes asked to make up formulas by a specific method, which he felt was unfair.

He stated that all teaching institutions teach their students several different methods, but would almost invariably lay particular stress upon one which would usually be the one employed in the wards of that particular hospital. Naturally, therefore, that method would be the one best known by the graduates of that institution, and any formula worked out according to that method would be as practicable as if worked out by any other method.

Dr. Mills also agreed with Dr. Le Boutillier that the home modification with whole milk and cream could be carried out by any mother, but that if the formula ordered be too complicated the mother would rarely take the time, even if she had the intelligence, to make it up.

Dr. S. W. Newmayer said: "In any symposium on infant feeding there are many assertions and discussions as well as guesses on the proportion of mothers feeding their babies by breast and the probable reasons for failure in many cases. I have brought some statistics which relate to this subject and may be of interest. Ten thousand babies were visited by nurses, and the character of feeding at the first visit was noted. These reports were then tabulated in groups according to age periods and character of feeding. The following are some of the results noted: In the age period from birth to one month, 91.8 per cent. were breast fed; one to three months, 74.4 per cent.; four to six months, 65 per cent.; six months to one year, 41 per cent.

These figures prove that most mothers immediately after the birth of their children and for the first month endeavor to feed by the breast. The period of medical supervision of maternity generally ends in this period with the belief by the attendant that the child is breast fed and safe. After the first month the percentage of breast fed rapidly decreases. Seldom does the physician know of this change, and it may be brought about by a neighbor advising the mother and on the smallest pretext claiming that the breast milk does not agree with the infant.

I agree with Dr. Le Boutillier that there was no longer much need for the laboratories for milk modification and that there were few mothers who could not be taught the home modification of milk.

Dr. McKee wisely called your attention to the fact that all mothers cannot feed their offspring by breast. It is a grave mistake not to recognize these cases where it is not feasable, as these infants lose several weeks of most valuable time in a critical period of life.

There is no doubt that when artificial feeding is required both the formula and the instructions cannot be too simplified. It is this reason mainly that makes the whole milk modification desirable.

Dr. D. J. Milton Miller said that he was in a position to see children who came from all parts of the country. He had noticed that the use of simple dilutions of milk with water was on the increase. This method started in Germany and students from Germany were settling in the West and using this method to a large extent. It has one great advantage and that is that it is simple, although perhaps it is not the very best method. Dr. Miller believes in percentage feeding but thinks that too much stress should not be laid on such and such a formula for such and such an age and that more stress should be laid upon the advantages of knowing the rôle played by the different elements used in the food and of adapting the food to the children's needs.

Dr. A. H. Davisson thought that the reason for some of the difficulties that arise in percentage feeding is that too high fats are given.

If the baby is started on a formula with a low fat, and then the fat gradually raised, the child will be able to take it perfectly.

Dr. Davisson sees nothing hard in percentage feeding, in fact by this method one knows just what he is giving and can make changes accordingly. He is surprised to hear anything against this method.

As for there being any mechanical difficulty for those who prepare the mixture this is nonsense. The amounts of the ingredients are made out by the physician, and the preparation of that mixture is no more difficult than with amounts decided upon in any other way. He has also used whole milk dilutions with very good results.

He can see now the reason for what prevalence there is in using whole milk dilutions as spoken of by Dr. Miller. If percentage feeding is not receiving the endorsement that it should, the general practitioner is apt to drift over to whole milk mixtures. Here also it must be borne in mind that there is a great difference between giving proportions of milk and water, without the ingredients in mind, and giving those proportions with the knowledge of just what they are in fats and proteids.

Dr. Walter Cornell had been strongly impressed with the simplicity of ordering whole milk dilutions for ignorant mothers.

Dr. Cornell believes that there should be some method of post-graduate instruction for the general practitioner in the subject of infant feeding.

In closing, Dr. Griffith said that it was a faulty argument that simple dilutions were an advantage because easy for the mother to employ. It is certainly just as easy for her to dilute, for instance, the top 20 ounces of the quart as it is to dilute the whole quart. Further, a long experience in prescribing formulæ for dispensary babies has shown him that the average poor mother experienced no difficulty in the use of both top and bottom milk, provided the physician explained it in a simple way. The whole problem is for the physician, not for the mother. The mother has no need to give any thought to the calculation of percentages.

He would like also to point out that just as soon as we employed skimmed milk as a part of our diluent, we were departing from the so-called simple dilutions and were really thinking in percentages as we ought to think. There is, of course, no reason why we should not use whole-milk dilutions, just as there is nothing against our employment of whole-milk and skimmed milk, top milk, gravity cream and whole milk, or any other combination. To confine ourselves to any one of these and not to know how to use the others may necessitate limiting ourselves to a very narrow range of formulæ. This is particularly true in the case of whole milk dilutions, in which we are unable to increase one ingredient without increasing another also. After all, the entire matter comes down to this: that we ought to know how to prescribe our formulæ in terms of fat, carbohydrate and protein, and not in terms of milk and water.

Dr. Graham, in closing, said that every college should teach one and only one method of infant feeding. One method is no more difficult than another. The physician may think in percentages, although he gives directions to the mother in ounces.

No one can think in ounces of cream or milk and know what he feeds the baby, unless he really think of cream or milk also in percentages.

Dr. Graham emphasized the point that he did not advise a set formula for a set age. He thinks that the student should be taught on certain broad principles. As the child gets older it, of course, gets more fat, more sugar and more protein, more food at each feeding, and takes its feedings at longer intervals.

SUBCUTANEOUS ADMINISTRATION OF FLUID IN ACUTE AND SUBACUTE CONDITIONS IN INFANCY—R. P. Smith (Canada Medical Association Journal, 1915, Vol. V., p. 894) records the use of normal saline solution, with or without 4 per cent. of dextrose, by hypodermoclysis in 72 infants. Sixty-five of these were grouped as intestinal, including marasmus or decomposition, acute intestinal intoxication and fermentative diarrhea. In 57 of the 72 cases there was need of saline administration on admission. Of the remainder all developed a decomposition, while in the hospital, necessitating the injection of saline. The intervals were three, viz., twice a day, three times a day and every three hours, all depending upon the indications. The average amount varied from 275 to 350 c.c. daily. This again depended upon the condition of the child. The largest administration was 750 c.c. and the smallest 50 c.c. There was a thermal rise in 6 cases, 5 of which were apparently due to distilled water, the other to an overdose—750 c.c. Sixty-two out of the 72 cases exhibited a rise in the weight curve. The remaining 10 were classified moribund on admission. In 3 cases there was obtained a slight local reaction, and in none of these, as far as anyone could judge, did this have any deleterious effect on the progress of the case. The subcutaneous injection of fluid is without danger, and in 71 per cent. of the cases there were observed a decided beneficial result. The general indications for the injection of fluid are evidenced by loss of tissue turgor and presence of dehydration, which exists in all infants suffering from diseases which produce rapid fluid losses from the body. The immediate results are evidenced by increase in weight, thus overcoming the rapid and frequently fatal initial loss; by improvement in tissue turgor; by improvement in the child's general condition. It is essential that the fluid for injection should be prepared from *freshly* distilled water.—*The American Journal of Obstetrics.*

DEPARTMENT OF ABSTRACTS

ORIGINAL CONDENSATIONS OF CURRENT PEDIATRIC LITERATURE BY THE EDITORS AND THE FOLLOWING ASSOCIATES

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ROGERS, MARK H.: OPERATIVE TREATMENT OF INFANTILE PARALYSIS. (American Journal of Orthopedic Surgery, July, 1916, p. 383.)

This report is based upon 130 cases from the Massachusetts General Hospital, which have occurred in the last eight years. Of the total number there were 79 over twelve years and 51 under twelve years. The cases have been divided into two general groups and the age twelve used as the dividing line, as the problems differ somewhat in the young child and in the adult.

The type of case that needs attention is that which shows a paralysis of one group of muscles and a powerful antagonistic group. In general, operative interference is postponed until a later age, as the end results are better, but when it is felt that a deformity is bound to occur an operation is advocated.

In a case of operative interference the value of Whitman's astragalectomy, silk ligament fixation, tendon transplantation and tendon fixation has to be considered.

The Whitman operation was performed in only 3 cases of children under twelve years and only in those cases of marked calcaneous. The known results have been good.

Silk ligament fixation has never been used in this series as a means of permanently holding and preventing deformity in a grown child.

Tendon transplantation in children has been confined to transferring the anterior tibial into the cuboid, and the perionei either between the tibia and fibula or into the scaphoid. The general average of the end results has been satisfactory.

Tendon fixation has been employed to a considerable extent during the last two years. Whether it can be used in older children and in adults is still unsettled. Tendon transplantation seems to be indicated in conjunction with it.

In the adult type, in the simple deformity of equino-varus with a moderate pes cavus and a lowering of the first metatarsal's head, good results are obtained by transplanting the extensor longus pollicis into the head of the last metatarsal and also lengthening the tendo-achillis.

In a moderate equino-varus a good result is obtained by transplanting a strong anterior tibial into the outer side of the foot after removing sufficient bone deformity from the fore foot.

The author believes the failures are due to avoiding enough bone resecting and relying too much upon the soft parts and upon the tendons.

In adults, with the vicious leverage and the deformity occurring at the astragalo-tibial joint, either an arthrodesis or an astragalectomy is indicated. The records show thirteen astragalectomies and thirteen arthrodeses in cases over twelve years. In the arthrodeses the figures show 50 per cent. failures. Astragalectomy was more favorable. Seven astragalectomies showed useful stable feet in 4 cases, slight instability in 2 cases and instability in 1 case.

The author concludes that it is better to do as small an amount of operating in children as possible, as long as there is no development of deformity. In adults tendon transplantation alone or in combination with resections of the bony structure have given good results. The Forbes operation is of definite value. Astragalectomy has given better results than arthrodeses of the ankle joint in those cases which present very marked deformity.

C. E. F.

WILSON: WALTER, J., JR.: HEART DISEASES IN CHILDREN. (The Journal of the Michigan State Medical Society, February, 1916, p. 68.)

Comparing recent statistics of heart disease in children taken from the records of the medical wards of the Boston Children's Hospital with those published over long periods and from various sources, but of less recent times, leads the author to conclude that more thorough and painstaking attention is directed to the examination of the heart in children than used to be the case. Whereas the author's statistics give a percentage of 5 per cent.

out of 592 cases, the earlier statistics give only around 3 per cent., but the number of cases is much larger.

According to Holt's experience, acute endocarditis is very rare under three years, but after the fifth year it is quite common. The position of the heart in infants and young children is a very important point to keep in mind. In infants the heart lies almost horizontal in the thoracic cavity. The apex if it is not more than one-third inch outside the nipple line is not abnormal in a child four years of age or under. From four to nine years of age the apex lies on the nipple line, while after thirteen years of age it should invariably be inside the mammary line. The apex is found in the fourth intercostal space during the first year; from the first to the seventh year in the fourth or fifth space; after the fifteenth year always in the fifth space. The pulse from the age of six to twelve months is at the rate of 105 to 115 per minute; from two to six years, 90 to 105 per minute; from seven to ten years, 80 to 90 per minute.

In discussing congenital heart lesions the author says that the least ominous form is pulmonary stenosis. The most common murmurs are systolic, and in the case of patent ductus arteriosus may be both systolic and diastolic and of a saw-like quality. When heart lesions are accompanied by cyanosis and clubbing of the fingers and other signs of venous stasis the patient usually dies in early adult life or before.

The author lays greatest stress on the numerous infections in childhood as a cause of heart disease usually not noticed until adult life. A very complete presentation of the symptoms of endocarditis are given, together with a diagnosis of the condition and the importance of its differentiation from middle-ear disease, nephritis, and tuberculosis. Sinus arrhythmia is a physiologic phenomenon in childhood, but is much exaggerated with the onset of an infectious disease. Premature beats are rare under fourteen years of age and may be a sign of too much digitalis medication. Auricular flutter, in which the auricles contract as a whole, but at a rate of 200 to 450 per minute, usually about 300 per minute is also found in children, a case record by Hume occurring in a girl seven years of age following diphtheria. Auricular fibrillation, in which there is a fibrillary contraction of the auricle, which results in sending of innumerable stimuli of contraction into the ventricle in an irregular manner, causing a grossly irregular pulse, has been found in children as young as thirteen years of age. Before the age of ten years sinus arrhythmia, heart block, premature systoles, paroxysmal tachycardia and auricular flutter may be observed, while after ten years of age auricular fibrillation is to be added to the list. The treatment of the various heart affections is outlined and follows the usual measures of rest, digitalis and sedatives. Four excellent tracings are given, together with the case histories, to elucidate the above-mentioned heart affections.

E. F. W.

ZINGHER, ABRAHAM: THE TREATMENT OF SCARLET FEVER WITH FRESH BLOOD FROM CONVALESCENT PATIENTS. (New York State Journal of Medicine, March, 1916, p. 112.)

The author describes the method of procedure and the results of injection in 14 toxic cases. The blood is either injected directly or previously citrated. When citrated 1 ounce of blood is added to 1 c.c. of a 10 per cent. sodium citrate solution. He finds that 4 ounces of blood can be easily injected into a young child and 8 into an adult. The sites for the injection are the gluteal region, the outer regions of the thighs, the calves and the triceps region. He finds the absorption of the blood mass takes place rapidly and without irritation. There is naturally no immediate increase of hemoglobin or red blood cells.

The cases selected were 14 of the severest among 650 admissions, the blood used was from donors convalescent from two to six weeks, and 75 to 250 c.c. were injected. In 7 of the cases the blood was citrated; 4 of the 14 patients died.

The author reviews the case histories, which are most instructive, and in summary notes the fact that frequently there was a critical drop in temperature, an improvement in the pulse, a lessening of cyanosis, a lowering of respiration, a fading of the eruption and a marked change in the general condition, particularly evidenced by the abatement of delirium.

Of the utmost importance is the following, where we quote the author direct: "An improvement in the general condition is seen even in the later septic forms of the disease, although the local phenomena are not influenced to any extent. It seems, therefore, that in the later septic cases, where the toxic element has disappeared from the clinical aspect of the case, these medium quantities of blood have no more specific action. We can, however, by using larger quantities of fresh normal blood, which may be more readily obtained from the relatives of the patient, exert a distinct beneficial effect on the disease, especially by injecting from 8 to 10 ounces of blood and repeating, if necessary, in four to five days. These larger quantities of fresh blood, containing a considerable amount of natural antibodies, have been found to exert a distinctly beneficial effect in several very septic late cases of scarlet fever admitted during the past winter." S. M.

BROWN, ALAN: INFLUENZA MENINGITIS WITH REPORT OF 2 CASES. (Canadian Medical Association Journal, December, 1915.)

Owing to the more extensive use of lumbar punctures in the diagnosis of meningitis, the author points out the fact that the influenza bacillus is a not infrequent cause of seropurulent meningitis. Influenza meningitis appears to be a very severe and fatal form of meningitis, and is exceeded in its fatality only by the pneumococcus and tuberculous forms. It is, however, an undecided question whether influenza bacilli may not occur in the cerebrospinal fluid without setting up inflammation as pneumococci and some other organisms have been known to do. The frequent findings of the bacillus in cases of endocarditis, purulent arthritis, empyema, appendicitis, peritonitis, meningitis, and otitis, as well as their frequent occurrence in the bronchial and nasopharyngeal secretions in cases of clinical influenza, indicates that this organism, like the pneumococcus, is capable of causing inflammations of the serous membranes anywhere in the body. The upper respiratory tract would appear to be the most frequent portal of entry into the body for these organisms. Whether the meninges are infected directly through the lymphatics is still a mooted question. Blood infection directly may be a source of connection between the nasopharynx and the meninges. Two cases are reported; one case is cited:

CASE I. Age five months; admitted with a history of coryza, fever and convulsions of four days' duration, the convulsions having commenced but forty-eight hours before entering the hospital. The family physician had been called in on account of "cold and bronchitis." Two days later the mother noticed retraction of the head; in addition to this, a slight intestinal upset. The child was well developed and nourished, fontanel bulging, slight retraction of the head, increased tendon reflexes, irregular respiration and general spasticity. Chest clear. Fundi showed an intense double papillitis. Double aural paracentesis revealed pus in both ears, from which smears and cultures showed almost pure influenza bacilli. There was a leukocytosis of 38,000, with 71 per cent. polymorphonuclears. Temperature ranged between 99°F. and 104°F. On the second and third day after admission 18 c.c. and 30 c.c. of influenzal serum were injected by the gravity method intraspinally; apparently the only benefit obtained from the serum being the increase in phagocytosis. The infant was almost moribund on admission and died in seventy-two hours. The blood culture obtained during life showed a pure growth of influenza. Cultures from the post-nasal space and from the pus obtained on paracentesis showed a profuse growth of influenza. A culture procured from the bronchial secretion did not reveal any influenza bacilli. Autopsy showed an extensive leptomeningitis, the exudate being thickest at the base, fatty infiltration of the liver, exudative nephritis and a very small superficial strip of bronchopneumonia at the left base. Postmortem cultures from the brain, heart's blood, left lung and mastoid showed pure influenza. The points of interest in this case are: (1) Path of infection, apparently through the ethmoidal plate with practically no involvement of the lungs; (2) The effect of the serum. This, of course, was not encouraging, although on the second day following injection there was marked phagocytosis.

The author's conclusions are that the influenza bacillus produces a purulent meningitis in many cases, and clinically and experimentally produces a septicemia and involvement of the serous cavities. H. R. M.

BLAIID, EMMET M.: RESECTION OF THE POSTERIOR CORD FOR THE CURE OF SPASTIC PARAPLEGIAS. (Ohio State Medical Journal, March, 1916, p. 167.)

Foester, in his work on the resection of the posterior roots of the spinal cord, was the first to offer any relief for the spastic paraplegias. This paralysis consists of a paralytic and a spastic component. The first is the break in the tract which prevents the impulses being propelled along the pyramidal tract to the muscle groups and thus prevents the normal voluntary movements. Sensory impulses passing along the spinal cord reflex arc maintain the muscle tonus and keep the muscles in a certain degree of fixation. This is termed the fixation reflex. Removal of the normal inhibitory action of the pyramidal tract upon this fixation reflex results in spastic muscle contractures. This is the spastic component of the paralysis. If the fixation reflex arcs of the spastic muscle are interrupted at any point the spastic condition is relieved. The posterior roots afford the only portion of the reflex arc which gives safe access to the surgeon's knife. Thus the crises of tabes, painful neuralgias and Little's disease can be greatly improved by the resection of the posterior roots.

The technique of this operation is that of an ordinary laminectomy, locating the posterior roots and resecting five or six roots on each side. The dura is closed with continuous catgut sutures. The author believes that it is of the utmost importance to block off the higher centers of the brain and the cord by injecting novocain in the spinal cord immediately above the seat of the operation. For actual muscle contractures, tendon lengthenings and tenotomies must be performed and plaster casts must be resorted to. The after treatment usually consumes from one to two years. In the author's 11 cases there was one death—a mortality of 10 per cent. The author reports 3 cases of Little's disease about one and one-half years after the operation, of which 2 are cured and 1 immeasurably improved. C. E. F.

SLOAN, H. G.: THE DIAGNOSIS OF INTRACRANIAL BLEEDING IN THE NEWBORN. (The Cleveland Medical Journal, December, 1915, p. 808.)

The author asserts that untreated intracranial hemorrhage in the newborn gives a mortality of 75 per cent. Those who recover usually have some defect of the central nervous system, such as Little's disease, epilepsy or internal hydrocephalus later in life. Wehye, of the Pathological Institute at Kiel, gives a summary of 959 autopsies of newborn babes. In 122 instances death was due to intracranial hemorrhage. Of these, 80 were found to have had a clot in contact with the dura; 56 in contact with the arachnoid; 36 in the substance of the brain; and 21 had hemorrhage in the ventricles. After explaining the several causes of brain hemorrhage in the newborn, the author details elaborately localization of each type of hemorrhage, its effect on brain tissue, such as irritation and edema, and the diagnosis of each form. The general symptoms are very completely outlined. Among the different forms of hemorrhage discussed in this paper are sub-tentorial bleeding, intraventricular hemorrhage, supra- and infra-tentorial combined bleeding and injury to the brain without bleeding. The operation of decompression is explained step by step.

In the summary of this paper the author says that in case of difficult or prolonged birth, where there has been a difficult instrumental delivery, or where there is tardy starting of spontaneous respiration, the babe ought to be carefully watched for the next few days to see if there is any evidence of cerebral bleeding. Early symptoms of cortical irritation are most valuable in localization of the bleeding. Bleeding above the tentorium can be differentiated from that occurring below it. When symptoms of general increase in intracranial pressure become marked a decompression operation ought to be done. The best results are seen when decompression is done while the pulse rate is still slow and before respiration becomes irregular. The reviewer is unable to do justice to this paper, as it covers the subject so comprehensively in all its phases. It is well worth reading from a surgical point of view. E. F. W.

GALLIE, W. E.: TENDON FIXATION IN INFANTILE PARALYSIS. (Annals of Surgery, October, 1915, p. 481.)

After three years the author is convinced that in the operation for tendon fixation (1) the tendon will unite solidly to the bone and no strain will loosen it, (2) the tendons do not stretch, (3) the rate of growth of the tendon between its point of artificial fixation and its point of insertion, as demonstrated in children whose limbs have doubled in size in three years, is practically the same rate as the growth in the rest of the limb.

In the correction of varus, the peroneus longus is fixed in the anterior border of the external malleolus and the tendon of the peroneus brevis is laid in a trough prepared for it behind the malleolus. With one groove anteriorly and the other posteriorly, the two tendons balance each other. The periosteum is sewed over the tendon.

In the deformity of calcaneous, the tendo Achilles is fixed in the posterior surface of the tibia and tendons of the peroneii are transplanted into the os calcis. The author has also found the method suitable and applicable to the various deformities that result from the paralysis of the triceps suræ and of the tibialis posticus muscles.

In cases where the deformity is present with only partial paralysis of the muscle, fixation of half of the tendon leaving the other half free to carry out its normal function is employed with most gratifying results.

Since the first publication of the method, 100 operations have been performed. Except 2 cases all have shown decided improvement. The first bad result was due to failure to scarify the tendons before burying them, and the second was caused by the changing of the position of the foot with the drawing loose of the tendon from the groove. In moderate cases of calcaneovalgus and dangle-foot the fixation method seems the operation of choice. C. E. F.

TABLER, L.: ZUR KLINIK DER DIAGNOSTICHEN BLUTENTNAHME UND DER INTRAVENÖSEN INJEKTION BEIM SÄUGLING. (Monats. für Kinderhk., 1915, Bd. XIII., pp. 384-392.)

The author remarks that the frequent necessity of obtaining blood from infants in larger quantities than the mere puncture of a finger will allow has necessitated that a practical method be adopted for general use. He comments on the difficulties in obtaining blood from the veins of infants, mentions the small size of their veins and the difficulty in reaching them, even after an exposure through incision with the aid of narcosis. In this way a procedure which should be marked for its simplicity becomes complicated and, in a measure, dangerous. He mentions the method originally suggested by Noeggerath, Welde and Dünzelmann, of using the veins of the scalp for intravenous injection, but he agrees with these authors in finding this method anything but ideal. Frequently the child moves its head. When this occurs either the needle pierces the wall of the vein or is jerked out of the vein.

Regarding the use of the external jugular for introducing injections, the author mentions the favorable experience of Wallstein and Morgan and of Schorer, the latter having used this route for diphtheria antitoxin. As a point against the use of the external jugular he cites difficulties encountered because of the awkward position for introduction of needle and the unfavorable effect of muscular movement, respiration and crying. He has also seen edema of the face and even necrosis following this method. In an experimental work on tuberculosis, he suggested using the largest superficial vein of the infant, namely, the superior sagittal or longitudinal sinus. He reviews the anatomy of the skin and of the sinus and of the coverings of the sinus, and notes that there is a thickness of from 2 to 5 m.m. separating the sinus from the outer air, while the diameter of the sinus is from 4 to 7 m.m. The anatomical position of the sinus never varies. In his experience he has occasionally missed the lumen, and in at least 1 case has pierced the wall of the sinus without ill effect. An autopsy in one of the cases confirmed the absence of injury.

The author's experience embraces over 50 cases and he rarely aspirated any cerebrospinal fluid. When it was aspirated it was always in minute amounts. He has used this method for blood cultures, for the injection of blood serum, diphtheria antitoxin, etc., and has never had bad results. He advocates it because of its simplicity and freedom from pain to the patient.

The technique is as follows: He uses a Record syringe with a platinum needle of 0.65 m.m. caliber size, 2½ c.m. long. There can be placed 8 to 10 m.m. from the point a band to prevent too deep an introduction. The child should be placed in the sitting position, and too great a pressure upon the cranium is to be avoided. If the sutures are still open we introduce the needle half way between the anterior and posterior fontanel. If the suture is partly or entirely closed we select the most posterior part of the greater fontanel for the puncture—the more posterior the puncture the greater is the advantage. The head is shaved, cleaned with benzine, then ether, and, lastly tincture of iodin applied. S. M.

SCRIPTURE, MAY KIRK: A CASE OF RE-EDUCATING SPEECH AFTER CLEFT PALATE OPERATION. (American Medicine, February, 1916, p. 116.)

The author describes an unusual case, an eighteen-year-old girl of Russian Hebrew parentage, who came to this country at the age of two. The child had never learned to speak and it was not till she had reached the age of twelve that her cleft palate was discovered. When fourteen years of age an operation was performed, with excellent result, but no attempt was made to teach her to talk. Four years later she came under the observation of Dr. Scripture, and after three weeks of instruction was able to speak in a normal manner. S. M.

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ORIGINAL COMMUNICATIONS

LYMPHOSARCOMA OF THE SIGMOID *

BY A L. GOODMAN, PH.G., M.D.

Instructor in Pediatrics, Columbia University; Visiting Physician to the Children's Department, German Hospital, New York City.

H. J., aged four years, was admitted to the German Hospital, February 24, 1916, complaining of chronic constipation and bleeding from the rectum, accompanied with extreme pallor and marked weakness, which commenced about three weeks before admission. At the same time, that is, three weeks before admission, the mother noticed a hard lump in the baby's abdomen. The child was in very good health up to four months before its entrance into the hospital, when the mother noticed that the child had become somewhat constipated. Previous to this time the bowels had been fairly regular. About two weeks before the

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* Read before the New York Pathological Society, May 17, 1916.

appearance of the blood, the mother noticed that the child would have severe abdominal cramps before an evacuation of the bowels. During the three weeks previous to her admission, there would be severe straining at stool, but no fecal matter would be expelled, but at times small quantities of pure blood. At one time, the mother said there was as much as half a pint of pure blood passed during one of these severe attacks of straining while the child sat on the vessel. These attacks became more frequent, and for the three days preceding her admission, the child would have two or three movements of pure blood during the day. The mother noticed that the lump in the abdomen would change its position from day to day, and that it had grown larger in size.

Upon examination the child showed:

General Condition—Extremely pale young girl of four, resting quietly in bed, not appearing acutely ill, showing no symptoms of respiratory embarrassment. Fairly well nourished, and developed. No jaundice or generalized skin eruption. There is a generalized glandular enlargement; the cervical axillary and inguinal nodes being palpable.

Head—Scalp; hair moderate in amount, dry, blonde in color, no seborrhoea. Ears; no mastoid tenderness, or discharge, drums normal. Eyes; no jaundice or petechiae. Pupils are equal, dilated, react well to light and accommodation. Conjunctiva pale. Throat; teeth in good condition, no pyorrhoea; no Koplik spots, no patches, tonsils markedly hypertrophied.

Neck—Carotid pulsations visible. Numerous nodes palpable. No rigidity or tenderness.

Chest—Expansion fair, slightly diminished and flattened on left side. Lower ribs rachitic in character.

Lungs—Dullness and prolonged expiration over left intraclavicular and upper axillary region, but no râles heard, likewise similar signs posteriorly over left upper chest.

Heart—Apex beat diffuse in fifth intercostal space about three-quarters of an inch beyond nipple line. Heaving precordia very evident but no palpable thrill. On percussion the heart is not only enlarged to the left, but also beyond the median border three-quarter of an inch to the right. On auscultation a loud blowing systolic murmur heard, transmitted to the axilla, and heard posteriorly. No murmur at base.

Liver—Dullness begins in fourth space, extends to free border. Spleen not felt.

Abdomen—Scaphoid type. On inspection an irregular mass is seen occupying the right umbilical and inguinal region. On palpation a hard, irregular nodular mass is felt parallel to Poupart's ligament, measuring 13½ cm. in length, and 5½ cm. in its broadest diameter. The tumor being twice as broad above as below, it is movable very freely and moves with respiration. It feels very superficial and can be displaced beyond the median line and above the umbilicus. No evidences of blood. No tenderness or rigidity.

Extremities—Knee-jerks active. No clonus or Babinski. No edema. Pulses are equal, regular, rapid; fair quality, easily compressible. Slight tendency to clubbing.

Family History—Negative. Mother has two children. One, the first, a boy six years old; second child, this patient, four years old.

Birth History—Full term child, forceps delivery, breathed at once, breast fed, dentition fourteenth month.

Weight—On admission weighed thirty-three and a half pounds.

Throat Culture—Negative.

von Pirquet Reaction—Negative.

Wassermann Reaction—Negative.

Vaginal Smear—Negative.

Blood Count—Hemoglobin, 55 c.c. White blood cells, 11,600. Polynuclears, 62%. Lymphocytes, 38%. Blood pressure, 110. Urine examination, 1,028, faint trace of albumen, no acetone, indican four plus. Microscopical examination of the feces showed pure blood, blood clots, scant fecal matter and no ova.

On admission to the hospital the abdominal tumor lay in the right iliac region. It was sausage-shaped in character, rather doughy to the touch, but not painful; with care it could be moved from one side of the abdomen to the other. Two days later, February 26th, the tumor remained in a tranverse position across the abdomen, corresponding to the transverse colon. On February 28th, the tumor moved across to the left side of the abdomen just below the splenic flexure of the colon.

Clinical Considerations—We have a child with a rather acute history of three weeks' duration, at which time it was seized with sudden abdominal pain, so severe in type that the child lay upon the floor and screamed with pain. The mother picked the child up, noticed the abdominal tumor and shortly afterward the child passed blood from the rectum. The blood was dark in color and clotted. From our past experience we have been taught that dark clotted blood passed from the rectum, indicates that the blood comes from high up in the intestine. The sudden appearance of the tumor, its sausage-shaped character, would lead one to consider in the differential diagnosis, the possibility of an intussusception of the intestine. Against the intussusception, were the painlessness of the tumor, the absence of vomiting, and the duration of the swelling, as well as the general glandular enlargement which spoke more in favor of a new growth. The negative von Pirquet, no signs of a general tuberculosis, excluded the possibility of a tuberculous condition of the omentum. With a constant loss of blood, the increasing pallor, the gradual increase in size of the swelling with its accompanying glandular involvement, indicated operative interference. An X-ray examination revealed a distinct obstruction in the large intestine which apparently was in the distal portion of the transverse colon.

Showing position of tumor on right side of abdomen

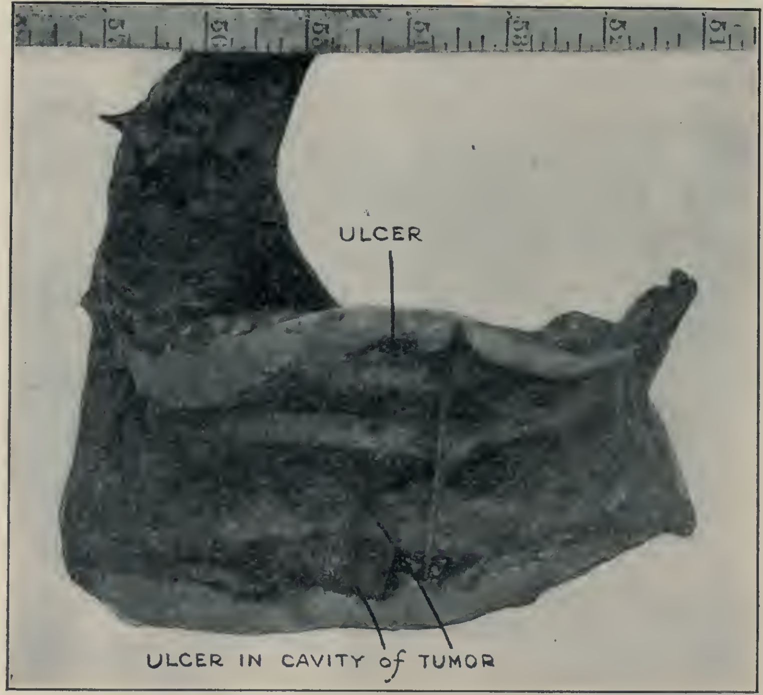
The roengentologist stated that from the character of the shadow he felt confident that the case was one of malignancy. On February 28th, the child was operated, and a three-inch midline incision was made over the region of the tumor. Upon exposing the abdominal contents, a tumor, about six inches in length, and three inches in width, of the sigmoid, was found with medistalic lymph nodes in the mesentery, also surrounding the gut. The tumor was removed, the two ends of the gut, one corresponding to that part of the sigmoid just below the splenic flexure of the colon, the other to the upper part of the rectum, were joined together, and a Murphy button introduced. The wound was closed in the usual manner.

Showing position of tumor on left side of abdomen two days later

On March 4th, the child died with symptoms of a general asthenia. The pathologist's report is as follows:

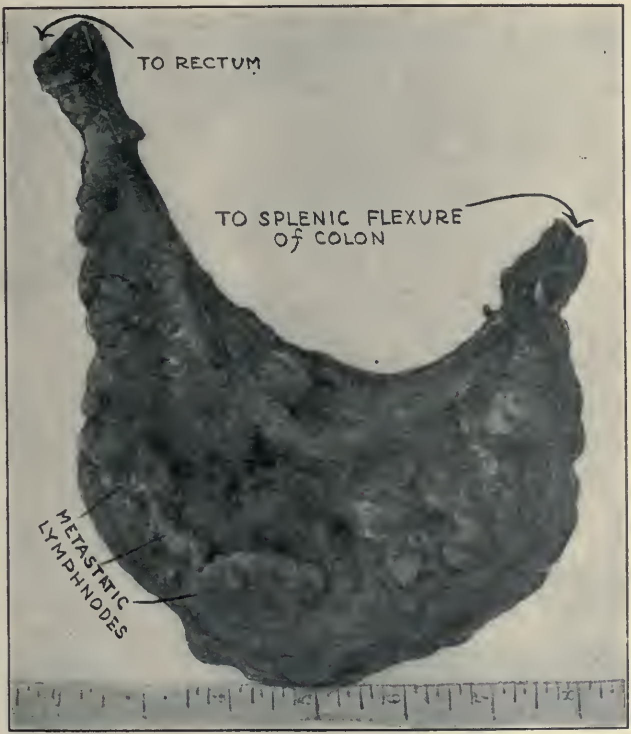
Anatomical Diagnosis—LYMPHOSARCOMA OF THE LARGE INTESTINE.

Gross Appearance—Specimen consists of a portion of the sigmoid, with incorporated tumor mass. The entire specimen measures 33 cm. in length. At one end is a considerable length of approximately normal gut measuring 13 cm. in length. The intestinal wall of the rest of the specimen is enormously, but somewhat irregularly, thickened, so that this extremity forms an ovoid tumor mass about 6.5 cm. in diameter at its widest part. Through this ovoid tumor mass the lumen of the intestine runs eccentrically, but to some extent the thickness of the wall extends around the whole circumference, in the thinnest portions averaging about 1 cm. in diameter; in the thickest, about 3 cm. At the opposite extremity is about 1 cm. of non-indurated gut wall. On section, the mucosa of the intestine corresponding to the tumor is replaced by an irregular white nodular tumor mass, one area extensively ulcerated, but for the most part fairly clean. The cross section of the gut wall appears of a chalky white color resembling lymphoid tissue. The outer surface is irregularly nodular and rather soft. In the remains of the mesentery are found some enlarged lymph nodes.



Tumor open. Note thickness of wall and deep ulcerations

Microscopical Examination of section through tumor shows the original structure of the intestinal wall to be practically entirely obliterated by a diffuse sarcomatous infiltration composed of closely packed, small, round cells about the size of lymphocytes. Only in a few regions are found traces of the smooth muscle and of the original mucous membrane. Externally is a thin capsule of fibrous tissue evidently peritoneum, but this also shows rather extensive tumor infiltration in most regions. The blood vessels are very scanty, consisting for the most part of thin walled capillaries unsupported by connective tissue. On the other hand, there are no marked areas of necrosis found in the sections examined. At the margins the tumor invades extensively the stroma of the mucous membranes; appears gradually to merge with the normal lymphoid tissue of the mucosa. Mitotic figures are exceedingly abundant.



Tumor after removal. Note relationship between normal lumen of intestine and tumor mass

In reviewing the literature of these cases it is interesting to note that in most of the cases reported the onset of the illness is always acute, the reason for this being that, with the gradual growth of the tumor, the lumen of the gut becomes more and more occluded, until it becomes so small that it is impossible for the fecal matter to pass the location of the tumor; this gives rise to symptoms which simulate, as I said before, acute or chronic intussusception of the intestine, from which condition, by study of the past history and careful physical examination, it must always be excluded.

To explain the dark, clotted blood in this case, we found that in the center of the tumor there existed a small cavity, the walls of which were represented by three deep ulcerations, from which the bleeding took place. The blood accumulated in these cavities and clotted, and, as the opening of the lower end of the tumor mass next to the gut was so small that one could hardly force the little finger through it, these clots may have remained in the cavity for some time before being passed. This fact must also always be taken into consideration when considering the presence of blood in the stools. Although these cases are not so extremely rare, each case is of sufficient importance to be reported.

OCCURRENCE OF DIPHTHERIA BACILLI IN NORMAL THROATS—On account of the frequency with which positive cultures of Klebs-Loeffler bacilli in apparently healthy throats have been reported, R. A. Keilty (Medical Record, August 21, 1915) took cultures from both tonsils of 97 students known to be free from exposure, to have sanitary housing conditions, and to be generally in good physical condition. Ninety-seven cases were examined over a period of two years—50 in one class and 47 in another. Of these, 21 cases had suspicious rods which morphologically resembled the Klebs-Loeffler bacillus. In no cases were they perfectly typical, and in no case did they occur in more than a few colonies. Of these, 4 cases were replated and recultured. But one of these was considered likely and this was injected into a 750-gram guinea-pig. A slight local reaction resulted and the pig was alive at the end of five days. This was considered a negative result and the type a pseudodiphtheria bacillus. The writer's conclusions are that the percentage of occurrence of Klebs-Loeffler bacilli in healthy normal adult throats under hygenic conditions is low or *nil*. A positive culture with suspicious membrane in this class of cases should have a great deal of weight. Granting this positive evidence of value, cultures play together too large a part in the routine handling of diphtheria.—*The American Journal of Obstetrics.*

A CLINICAL STUDY OF SIXTY CASES OF POST-NASAL INFECTIONS IN PRIVATE PRACTICE, WITH REPORT OF SIX CASES, COMPLICATED BY ACUTE HEMORRHAGIC NEPHRITIS *

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The occurrence during the early months of the year 1915 of an infection with the focus in the post-nasal space, complicated in 5 cases with acute hemorrhagic nephritis, prompted me to study and select from the records of my private cases a group of 60. To be sure no great conclusions can be drawn from an observation of 60 cases, but I trust the following analysis and reports will claim your attention and interest. All medical men who have to do with children are aware of the frequency of acute nasal, nasopharyngeal and pharyngeal infections, with the symptoms of general infection or toxemia. These cases are common and elementary, but this group is chosen because of its apparent epidemic character and the unusual complications. The study does not include the bacteriology, but observations are entirely limited to the clinical manifestations. Sixty cases were selected in which there were only 3 complicated by an acute tonsillitis. It is easy to see that where the tonsils were involved one could not classify such as typical post-nasal infections. The focus may have been primary in the post-nasal space or primary in the faucial tonsil, therefore since such a distinction could not be made, it was deemed wise to exclude from this group all cases where the tonsils were simultaneously involved. The analysis of these cases in detail is as follows:

Age one to two years—

Post-nasal infections, 29	Otitis media	24
	Adenitis	7
	Hemorrhagic nephritis	1
Otitis media, 24	Pneumonia	2
	Pyelitis	1
	Asthma	1
	Adenitis	4
	Post-pharyngeal abscess	1

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* Read before the Chicago Pediatric Society, November 16, 1915.

Both ears operated	4
One ear operated	5
Non-operative	15

Age three to five years—

Post-nasal infections, 20	Adenitis	8
	Tonsillitis	1
	Otitis media	12
Otitis media, 12.	Adenitis	3

Both ears operated	2
One ear operated	2
Non-operative	8

Age six to eight years—

Post-nasal infections, 11	Hemorrhagic nephritis	4
	Nephritis	1
	Tonsillitis	2
	Adenitis	5
	Pyelitis	1
Otitis media, 6	Nephritis	2
	Encephalitis	1
	Measles	1
	Adenitis	1

Both ears operated	1
One ear operated	3
Non-operative	2

The analysis of these 60 cases shows that complications occurred in 58, so that practically all cases of post-nasal infections have some form of complication. Of these complications otitis media occurred in 42 cases, or 70 per cent. In the first two years of life 24 out of 29 cases had otitis media, or about 80 per cent.; from three to five years, 60 per cent.; and in six to eight years, a little over 50 per cent. Of the complications aside from otitis media, cervical adenitis was most frequent, occurring in 20 cases (33⅓ per cent.). Adenitis occurred in about one-third of the cases in the first two years of life, 40 per cent. from three to five years, and about 45 per cent. from six to eight years, the adenitis being more frequent in the older children.

The next complication in order of frequency was nephritis, occurring in 6 cases, (10 per cent.), 5 of which were of the hemorrhagic variety and reported in detail in this paper. Only 1 case occurred in a child of two years; all of the others occurred at the age of six to eight years. The analysis of the 42 cases of otitis media shows that about 55 per cent. occurred in the first years of life, and during this period other complications were less frequent. About 80 per cent. of all the post-nasal infections in the first two years had otitis media, 55 per cent. of the post-nasal infections at three to five years, and 55 per cent. in six to eight years. Whereas, the occurrence of otitis media was less frequent during the period from three to eight years, the occurrence of other and more serious complications was more frequent. Of the 42 cases of otitis media, 17 had paracentesis done, or about 40 per cent. Two of the cases which were most severely sick had a paracentesis done early. About 65 per cent. of the cases occurring in the first two years were not operated on.

From six to eight years, however, there were twice as many operative cases as non-operative. Of the 4 cases of acute nephritis, 2 had the otitis media and a paracentesis was done in both cases; 2 cases had had a tonsil and adenoid operation prior to the infection, 1 had a double otitis media and the other a cervical adenitis; 2 cases were in one family. Of the 3 cases operated on for tonsils and adenoids since the attack, 1 is reported in detail in Case No. 3. It seems safe to conclude that the middle ear in infants was vulnerable to this attacking organism and that these infants were less subject to all other kinds of focal and general complications. Their chances of recovery are more than equal, whether a paracentesis is done or not. Exception would undoubtedly be taken to this statement, but my records show that the cases without drainage through the external auditory canal recovered as quickly and as completely as those which drained either as a result of paracentesis or spontaneous rupture—15 cases without drainage and 9 cases with drainage. In several cases in which both ears were involved paracentesis was done in the one ear and not in the other and no appreciable difference was noted in the period of recovery.

In older children, however, this will not hold true. With a post-nasal infection with or without accompanying otitis media, complications were much more common and severe in character. Of the group of 21 at the age of six to eight years which suffered complications, 7 cases showed involvement of the urinary tract, 6 with an acute nephritis and 1 with pyelitis, or $33\frac{1}{3}$ per cent.

REPORT OF CASES

CASE NO. 1. M. S., girl, age five years.

Previous illness negative, not even the mildest infectious diseases of childhood. General health has always been good. Observations during infancy showed no feeding disturbances; family history negative, except the mother is not rugged; has shown some secondary anemia, but otherwise no organic disturbances. Father in good health.

Present illness began March 7th. Was called to see the child because she did not seem well, as the mother expressed it; child was up and about manifesting usual interest in play; had a good appetite. Examination at this time showed no abnormal physical findings, except evidences of coryza and obstructed nasal passages; some mucopurulent discharge from the post-nasal space. Two days later was again called to see the child; found her in bed, temperature, 103°, face puffed, eyes swollen, distinctly stupid and probably slightly deaf. At that time it was believed that the child was stupid and not suffering from impairment of hearing. The urine was very scanty and on gross inspection had the appearance of blood. Examination of the specimen showed quantities of blood, large amount of albumin and granular casts. Child had some cough, the temperature was 104°; this was the highest recorded during the illness. The edema of the face was quite marked.

The next day the child complained of pain in the left ear; examination showed involvement of the middle ear and paracentesis resulted in free drainage. Within twenty-four hours the right ear was involved and a paracentesis was done with the same results. Examination of the culture from the nose and ear showed a pure staphylococcus infection. The tonsils and pharynx were free from evidences of infection. Heart and lungs normal. Abdomen normal except considerable tympanites; edema was present in a mild degree in the abdominal wall and lumbar region. Stupor persisted for several days; occasional mild delirium; vomiting occurred on the fourth day and was repeated a few times only during the period of the illness. Epistaxis occurred on the fifth day and to a slight degree on the seventh day. The eyes showed a marked conjunctivitis on the eighth day, but cleared up rapidly. The temperature gradually subsided after the first two or three days until the sixth day of the illness, when it rose to 103°, apparently as a result of imperfect drainage of the ears, gradually returning to normal in a period of four weeks. In the third week there was a sudden rise to 102°, which lasted only twenty-four hours. Constipation was very marked during the whole period of the illness.

The urine during the first three days was approximately 5 to 6 ounces in twenty-four hours; on the fourth day the amount was 16 ounces and gradually increased during the following days and weeks until it reached an average daily amount of 30 to 40 ounces. The albumin, blood and casts gradually decreased. On the sixtieth day no albumin, a few pus cells, and a few granular casts were found. From this period for eight days the child ran a slight temperature, showed a number of white blood cells in the urine and an occasional red blood cell. Fifteen weeks after the inception of the illness the urinalysis showed two or three red blood cells and four to five white cells to each field. The last analysis, made November 18, 1915, showed normal findings. Recovery complete.

The history of this case is given in detail, because it shows that acute hemorrhagic nephritis was evident at the very beginning of the illness, only two days having passed from the time that the post-nasal infection was observed until the blood appeared in the urine. The symptoms pointing toward otitis media occurred thirty-six hours after the nephritis was present. The pharyngeal tonsils were entirely free from infection. The cervical glands showed some involvement about the fourteenth day. The prolonged period of kidney involvement, with a mild acute pyelitis in the third month. The final complete cure.

CASE NO. 2. Girl, age eight years.

Previous illness none. This patient was sister of Case No. 1. Taken on the same day, that is, March 9th, with symptoms of nasal and post-nasal infection complicated by tonsillitis. Initial temperature of 102°. This case ran the usual course of such infections for ten days, with a gradual subsidence of the temperature, but not entire cessation of fever. Child was bright, and it was with difficulty that she was kept in bed. During this period of ten days two examinations of the urine showed negative findings, with exception of a considerable amount of indican in the first specimen. On the eleventh day she showed a rise of temperature; was stupid; had distinct edema of the face; very feverish. It was noted at this time that the cervical glands were swollen and painful. Child complained of headache and vomited at intervals for several days.

The urine showed a very distinct amount of albumin, a few pus cells, few red cells, and a few hyalin casts; in two days more a large amount of albumin, much blood and many hyalin and granular casts. Amount was reduced from about 30 ounces daily at the beginning of this complication to 4 or 5 ounces daily for several days. The amount gradually increased until in another ten days it had reached 30 to 35 ounces output daily. The character also improved so that in about one month the findings were practically normal. Three months from the onset of the nephritis, a specimen showed two or three red blood cells and one granular cast. The child's recovery since then has been complete and at present she weighs 62½ pounds. Examination of the culture taken from the nasal passage showed a pure staphylococcus and streptococcus.

The important factors in this case are that the nephritis developed ten days after the onset of the infection, and the case was complicated by a tonsillitis; otitis media was not present. Cervical adenitis was a prominent feature. Cases No. 1 and 2 were sisters, living under the best possible hygienic and home conditions, infected at the same time; the original focus of infection in each was in the post-nasal space, both of them gave a pure culture of staphylococcus from this focus and both developed a hemorrhagic nephritis, the difference being that Case No. 2 had an interval of ten days from the onset until the development of the complication. The convalescence has been equal and complete in each case.

CASE NO. 3. C. C., boy, age seven years.

Previous History—The child had been subject to frequent attacks of bronchitis; had whooping-cough; no other diseases of childhood. Present attack began March 1st, with evidence of a post-nasal infection; within two days otitis media developed in the left ear. Paracentesis was done with free drainage. The right ear was involved later, but not opened, and the infection entirely subsided. The tonsils and pharynx were free from infection. The course of the case was similar to that of an ordinary otitis media until the twelfth day, when the child was suddenly taken with profuse vomiting, edema of the face and legs and rise of temperature; urine contained large amounts of blood and albumin and many granular casts, scanty in amount, from 4 to 10 ounces daily over a period of a week. Vomiting persisted for ten days; much blood was found in the urine for about twelve days, together with many hyalin and granular casts. On April 2d, no albumin and only a few stray blood cells. Temperature remained about 99° from March 27th to April 10th. During this period the convalescence was excellent and the child was allowed to get up about April 15th. At that time the mother noticed that he had great difficulty in walking. It was assumed that this was due to his long period in bed; however, it was observed that his temperature in the afternoon ran from 99° to 100°.

The general condition of the child was excellent, and upon examination April 25th (upon my return to the city after two weeks' absence) I found the child was somewhat pale, appetite was good, mentally active, general condition excellent. Urine free from trouble, but a very marked spasticity of the lower extremities with a pronounced ankle-clonus. The gait was distinctly spastic in character; temperature about 99° in the afternoon; child was kept in bed for a week under observation. Ears and throat, heart, lungs, glands normal; no eye symptoms; distinct increase of reflexes of the upper extremities. The spasticity gradually improved, and about May 10th he went to another city. Later report showed a very marked improvement, until finally there was no spasticity and no difficulty in walking. During the summer, however, the child ran a little temperature, and it was finally agreed advisable to have the tonsils and adenoids removed. The doctor in charge reported to me that the operation was done and the tonsils were found diseased and the child was much improved since the operation. Child seen August 31st, showed entire absence of physical findings, operation for tonsils and adenoids successfully done, knee-jerks were normal, child walked and ran and generally played as other children of his age. Temperature normal, urine normal. Recovery complete.

CASE NO. 4. Boy, aged eight years.

Seen first two weeks after an attack of tonsillitis (diagnosed by the mother). At the time of examination the child had an evident post-nasal infection of a mild character, temperature about 100°, edema very distinct on the face, none on the body and extremities. Mother had observed that the child had been "getting fat" for several days. The urine showed a large amount of blood, albumin and a few granular casts. The child responded rapidly to treatment, so that in about ten days no albumin was found and but few blood cells and casts. The recovery was uneventful, except two months after the case was first seen the urine showed ten to twelve red blood cells to the field. A specimen examined six weeks later was absolutely normal. The hemorrhagic nephritis occurred ten days after the original attack of supposed tonsillar infection and was coincident with the acute attack of post-nasal infection.

CASE No. 5. Boy, aged three years.

Seen in consultation with Dr. Yeakel. Had been ill about six weeks, when first seen by me, with a history of having an acute nasal cold followed by pneumonia and pleurisy, and at the time I examined him he had evidence of a post-nasal infection, ears were normal; indeed, the physical findings were normal except the child was running a temperature, had some cervical adenitis and the urinary findings of blood, albumin and casts. The child made an uneventful recovery and an examination of the child made August 17th showed him to be in perfect condition and the urine entirely free of evidences of nephritis.

CASE No. 6. Boy, aged six years.

Came to the out-patient department of the Children's Hospital November, 1915, with the history of having had no acute infectious diseases in recent months. Had been suffering with an acute coryza for several days previous to coming to the hospital, together with general debility, stupidity and swollen face. About one week earlier had swollen glands under and posterior to left ear lasting only a few days. Examination showed the throat normal, some mucopurulent discharge from the post-nasal space, marked edema of the face and abdominal wall. Urine showed blood, albumin and casts in bundance. Child was admitted into hospital under Dr. Walker's service and for three or four weeks followed usual course until complete recovery.

These cases are reported in detail because they are unusual in my experience and unusual in reported cases, as I have been able to gain access to the literature. The cases, except one, occurred during the first two weeks of March, 1915. It is not certain whether these cases were strictly infection of the kidney or whether they were cases of nephritis resulting from the toxins of the infection. The clinical findings corresponded to cases of acute hemorrhagic nephritis. The bacteriology of the urine was not studied; none of the cases were treated with hexamethylenamin; 5 showed distinct edema when seen by me, and in the other the history was not clear as to the presence of edema during the period of the trouble. The urinary findings were characteristic of an acute hemorrhagic nephritis and in one case two months later there was a mild pyelitis. This occurred in Case No. 1. The recovery in these cases was not rapid, since in 4 of them blood and casts were found in specimens two or three months after the onset of the disease. One of the cases had acute infection of the tonsils at the time of the post-nasal infection; a second case (No. 4) gave a doubtful history of having had tonsillitis some two weeks before, and the presence of post-nasal infection a few days before the onset of the acute nephritis. The other 4 cases had no tonsil involvement. Attention is drawn to this particularly because of the relatively infrequent occurrence of nephritis, following a pure post-nasal infection. Case No. 3 showed perhaps the most interesting group of complications; the acute post-nasal infection quickly followed by an otitis media and the development of nephritis within ten days; improvement in four weeks, followed by a marked spastic paraplegia, which disappeared after several weeks; extirpation of tonsils and adenoids, with complete recovery.

FREQUENCY—A search of literature shows very few cases of acute nephritis complicating post-nasal infections with or without otitis media. The literature is full of reports of cases of acute nephritis following acute tonsillitis. Of the cases reported following tonsillitis but little mention is made of the involvement of the post-nasal space as the original focus of infection. The pharyngeal tonsil is given the full credit for the condition. In my experience the above cases are the first I have seen directly due to infections of the post-nasal space, appreciating at the same time that in one of the cases reported the tonsils may have been equally responsible with the post-nasal space, and in one of the other cases it is possible that the tonsils were in part responsible. It is interesting to note that out of over 1,000 cases of all kinds admitted to the Children's Memorial Hospital during the first six months of 1915, and about 6,000 or 7,000 treated in the out-patient department during the same period, there is a record of only 1 case of acute hemorrhagic nephritis. At first it occurred to me that these cases may have been more especially noticed in private practice, yet the cases reported by Grulee were hospital cases.

There were some points of difference, however, from Grulee's cases. In the first place, out of 6 cases which he reported 1 had an acute otitis media with a mastoid condition and 1 gave a history of drainage from the ear, and in neither of these cases was there any history or examination showing any evidence of tonsil involvement. A third case showed a severe coryza for a month and an enlarged infected tonsil; the other 3 were distinctly tonsil cases. In my cases only 1 showed tonsillar involvement in addition to the post-nasal infection. Grulee states that in none of his cases was the edema and pallor characteristic of a scarlatinal nephritis. In 5 of my cases edema and pallor were pronounced symptoms. Grulee's treatment was based on the probable infectious nature of the kidney condition; the treatment followed out in my cases was based on the toxic nature of kidney involvement. Especial comparison is made with his report because the two groups of cases occurred about the same time and in the same community. A search of the literature shows that the occurrence of a hemorrhagic nephritis directly dependent upon an infection localized in the post-nasal space, including otitis media, is a rare occurrence; particularly is this true when one considers the large number of cases of post-nasal infections and in recent years the apparently increased number of cases of otitis media. Several writers mention cases following otitis media, and one or two speak of colds or influenza as immediate causes; the great majority discuss only the pharyngeal tonsil as the etiological factor in the upper respiratory tract.

DIAGNOSIS—The diagnosis of post-nasal infections was made from the presence of constitutional symptoms of an infectious condition supplemented by negative physical findings in all parts of the body, except on the part of the nasal passages. The symptoms present varied; there were either evidences of a mild coryza or obstruction to nasal breathing with the anterior nares free and a mucopurulent discharge from the post-nasal space into the pharynx, together with the occurrence of otitis media in 75 per cent. of the cases. The attempt was made in this group to exclude the pharyngeal tonsil as a factor in the causation of this infection. This is practically true in all at the age of two years or under. In some of the cases there was present adenitis involving the lymphatic glands posterior to the sternocleidomastoid muscle. These glands drain the post-nasal space. In none of the cases was there suppuration of the glands. In some of the most severe infections a bloody discharge was observed through the nose and through the pharynx. The duration of the infection, exclusive of complications, varied from one to three weeks; complications on the part of the kidneys or glands protracted the course. No complications on the part of the heart were observed.

TREATMENT—The general treatment followed was: rest in bed during the acute febrile period, a mild laxative in many of the cases and usually an alkali in the form of bicarbonate of soda, or citrate of soda; baths if necessary for temperature. The local treatment was important, as noted above. The results obtained in cases of otitis media without paracentesis were practically as good as those where a paracentesis was done; this does not mean that one should advise against a paracentesis, but in my judgment it is not good treatment to do a paracentesis in every case of otitis media. A large percentage of cases will get well without puncturing the ear drum. In all cases I used irrigation of the ear with warm water or warm boric acid solution or warm bicarbonate of soda solution, two or three times in twenty-four hours. Two per cent. carbolic acid in glycerin was instilled into the ear if no drainage, at intervals of every three hours during the waking period. A number of these cases were treated in this way, in which both ears were infected, one ear being operated on and the other not. Upon examination the physical condition of the ear drum seemed the same in each instance, so that one would hesitate to say that there was any more indication for puncturing one drum than the other.

The indications for paracentesis are clear—a swollen, bulging, reddened ear drum. Puncturing such an ear drum is followed by good results. The otologists are agreed that the after treatment of paracentesis depends on the freedom of the drainage. If the drainage is free, pain has subsided and the temperature lowered, simple cleansing of the external canal is sufficient; otherwise warm water irrigation. In no case was there a mastoid involvement. A question arose as to the treatment which should be used in the nasal passages. In this there is full opportunity for differences of opinion. My experience favors irrigation of the nasal passages with warm alkaline solution under gravity pressure, this to be used twice a day.

The treatment of the cases of nephritis was practically the same as that followed for such cases from other causes. Patients were kept in bed until the edema had disappeared, temperature had been normal two or three weeks and the urine showed no albumin or casts; some of the cases were allowed up before the microscopic blood disappeared. Fisher's solution was used per rectum both by the drop method and instillation in 4 of the cases. The immediate recovery occurred in about four weeks, and the ultimate clearing up of the urine required from two to four months.

SUMMARY

First—Post-nasal infections in infancy and childhood were unusually common in winter and spring of 1915.

Second—The cases studied bacteriologically did not show the prevalence of the streptococcus; cases examined showed usually a pure culture of staphylococcus.

Third—There was evidently a predilection for the infection to localize in the post-nasal space, and in more than 75 per cent. of the cases to involve the middle ear.

Fourth—The pharyngeal tonsils were particularly free from acute involvement. This is especially interesting because of the contrast to the tonsil involvement in epidemics of nose and throat infections that have occurred at intervals in the past six or eight years in Chicago.

Fifth—The especial frequency of the involvement of the middle ear of infants under two years of age, due probably to the susceptibility of the third tonsil to infection and the infrequency of any other complication at that age except cervical adenitis.

Sixth—The evident importance of the post-nasal space as the atrium for general infection.

Seventh—The susceptibility on the part of the kidneys to the toxins of this infection, in older children of this group occurring in 33 per cent. of the cases after the third year.

Eighth—It is important not to be hasty in doing a paracentesis in all cases of involvement of middle ear infection, especially in infants under two years of age.

Ninth—The use of a nasal douche with gravity pressure is to be recommended in the treatment of post-nasal infections in a majority of cases.

Tenth—The occurrence of an acute hemorrhagic nephritis as a complication of what at first thought may seem to be a mild cold in the head, or a simple earache, should teach us the importance of proper care of all simple infections of the upper respiratory tract and the necessity of being constantly alert to the possibility of the development of such a severe complication.

4603 Broadway.

PREVALENCE OF CONGENITAL SYPHILIS AMONG THE NEWLY BORN OF THE EAST END OF LONDON—The object of an investigation by P. Fildes (Jour. Obst. and Gyn. Brit. Emp., 1915, Vol. XXVII., p. 124) was to determine the incidence of syphilis in infants as a result of a congenital infection. For this purpose it was arranged to perform the Wassermann test upon 1,000 infants at birth, and again upon the same infants and their mothers at a certain period after birth. It is assumed that the great majority of cases of congenital syphilis will develop a Wassermann reaction in two and a half to four months after birth. The population examined was probably representative of other groups of similar social status in different parts of London, namely, the respectable laboring classes. In this population: (*a*) only 1 baby in 1,015 showed symptoms of syphilis at birth; (*b*) only 3 babies in 660 developed syphilis, as evidenced by a positive Wassermann reaction during the period of observation, and of these only 1 showed symptoms; (*c*) thus only 4 instances of syphilis were detected among 677 babies (5.9 per 1,000), and of these 1 died and 2 showed no symptoms; (*d*) only 1 child died of syphilis, while 16 were lost presumably from other causes. Twenty-seven (3.9 per 100) of the women gave a positive Wassermann reaction, but only four of these transmitted. The Wassermann reaction obtained with blood from the placental end of the umbilical cord is not diagnostic of syphilis in the infant, but of syphilis in the mother. However, only a minority of syphilitic women induce this positive reaction in the umbilical cord serum, and only a minority of syphilitic children give this reaction at birth.—*American Journal of Obstetrics.*

EOSINOPHILIA OCCURRING IN INFANTS FOLLOWING THE INGESTION OF A FOREIGN PROTEIN *

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Recent work has shown that several common diseases, accompanied by an increase in the eosinophilic cell count in the blood, are due to an allergy to one or more proteins, to which the individual is sensitive. This is shown by the work of Goodale on horse asthma in human beings; and of Herrick on the intraperitoneal injection of an aqueous extract of ascaris lumbricoides in guinea-pigs.

Herrick injected an aqueous extract of ascaris lumbricoides intraperitoneally in guinea-pigs, and reached the following conclusions:

(1) Notable eosinophilia can be produced by intraperitoneal injection of an aqueous extract of ascaris lumbricoides, in guinea-pigs, and the substance producing the eosinophilia is a protein.

(2) Previous sensitization is necessary to produce eosinophilia.

(3) It is impossible to produce eosinophilia in this way in animals which have been immunized to this extract.

(4) Eosinophilia is therefore evidence of previous sensitization.

H. Schlecht and G. Schwenker carried on a long series of experiments with egg albumen, horse serum and human serum. They also employed water through which human breath had been expired. With these substances the animals used were injected intravenously, and intraperitoneally. The animals used in these experiments showed the characteristic clinical symptoms of anaphylactic shock, with eosinophilia. Control animals asphyxiated in a closed chamber or killed with peptone, showed no anaphylactic disturbances (no eosinophilic cell increase). They arrive at the following conclusions:

(1) In animals which were sensitized to one of the substances mentioned, and later reinjected, intraperitoneally, or intravenously with this substance, eosinophilia resulted in about six hours.

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(2) Egg albumin administered to guinea-pigs or dogs, intraperitoneally, or intravenously, when previously sensitized to it, produced an eosinophilia.

(3) High eosinophilic cell counts in these cases were accompanied by clinical anaphylactic shock.

(4) In these cases the bronchi and lungs particularly were infiltrated with eosinophiles.

(5) These writers suggest that the eosinophile cells may be brought out of the bone marrow by a chemotaxis.

M. Weinberg and P. Sequin injected horse serum intraperitoneally and intravenously into guinea-pigs. They did not obtain the results claimed by Herrick, and Schlecht and Schwenker.

F. H. Johns, in reporting his work, concludes as follows:

(1) Vegetable proteins do not produce an eosinophilic cell increase.

(2) Animal proteins (particularly those derived from the higher animals) always produce an eosinophilia, but only after a sensitizing dose is first given.

(3) A first injection of horse serum does not produce an eosinophilia; subsequent injection does.

(4) Trichina infections show no eosinophilic cell increase during the period of invasion, but only after the body has become sensitized to the parasite, or its products.

O. M. Schloss fed guinea-pigs with various foreign proteins and noted an eosinophilia. He also reported the case of a breast-fed infant, which was put on a cow's milk modification. An eosinophilia resulted, which reached its maximum on the tenth day.

Dr. Fritz B. Talbot, seeing the bearing this work might have on the subject of weaning, suggested the problem which forms the basis of this paper.

The problem of finding weaning infants with an authentic dietary history, and under circumstances that permit of absolute dietary control, is indeed a difficult one. It was through the kindness and hearty coöperation of St. Mary's Infant Asylum, in Boston, that a large portion of the cases in this series were observed.
Differential blood counts were made on infants after the administration of foreign protein in the food. Particular at-

TABLE I.

BABY	AGE IN MOS.	REMARKS	DIETARY HISTORY	EXPERIMENTAL FOOD GIVEN	Initial % Pres	PERCENTAGE EOSINOPHILES PRESENT ON DAYS AFTER FEEDINGS BEGAN																	
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Sh.	10	Lobar pneumonia	Cow's milk modification since birth	1 feeding of sheep's milk modification	2	1½	1	0	1	0	0	..	2	1	1½	4¾	..	2	1¼				
Fitz.	4½	Healthy Normal	Entirely breast fed	1 daily feeding of cow's milk modification	0	..	0	..	0	..	3	0	1½	0	10	4	0	2	0	0	0	0	
Kol.	3	Normal	Entirely breast fed	1 daily feeding of cow's milk modification	0	..	3	..	1	..	2	0	2	0	0	8	7	4	0	0	0	1¼	
Burk.	3½	Marasmus	Entirely breast fed	1 daily feeding of cow's milk modification	0	..	0	..	0	..	0	0	0	8	0	1	Died						
Lip.	...	O. P. D. case Healthy	Entirely breast fed	Entirely on cow's milk modification	..	..	..	..	..	..	..	7	..	..	1	..	0	Lost from observation. O. P. D.					
Ril.	¾	Normal	Entirely breast fed	1 daily feeding of barley water	1	..	2	..	1	..	2	2	2	..	6	5	3	4	3	1½	0	0	
Keen.	3	Normal	Entirely breast fed	1 daily feeding of barley water	..	..	2	..	0	..	0	1	1¼	4	2	0	2	0	2	0	0	0	
Dol.	¾	Normal	Entirely breast fed	1 daily feeding of egg (hen) albumen water	..	6	6	0	10	4	9	9	4	7	4	0	6						
Holl.	...	Normal	Entirely breast fed	1 daily feeding of cow's milk modification	..	..	0	..	2	..	3	4	6	2	3	1½	6	0	0	0	0		
Aber.	4	Fermental diarrhea	Breast fed 2 mos.; condensed milk since	1 feeding of egg (hen) albumen water	1	..	1	..	2½	..	4	..	3	..	0	..	0	0					
Sull.	...	Lobar pneumonia diarrhea	Entirely breast fed	Cow's milk modification at night; breast during day	0	0	0	..	1	..	..	0	..	0	..	5½	O. P. D. case. Lost from observation						
Garr.	2/3	Normal	Entirely breast fed	1 daily feeding of egg albumen water	0	1	0	..	7	7	0	0	1¼	0	1½	0	1	0					
Kel.	2	Normal	Entirely breast fed	1 daily feeding of cow's milk modification	0	..	0	..	0	..	4	0	3	0	0	0	0	0	0	0	0	0	
Mol.	5/6	Marasmus	Entirely breast fed	1-3 daily feedings of cow's milk modification	3	..	0	..	0	..	0	7	0	3	1	2	5	Died					
Cool.	1	Marasmus	Entirely breast fed	1 daily feeding of cow's milk modification	0	..	0	..	0	..	0	0	5	1	4	Died							

Mov.	...	Normal	Entirely breast fed	3 daily feedings of cow's milk modification	0	0	..	..	0	..	0	..	0	..	3	1	..	0					
Arb.	...	Normal weaning	Entirely breast fed	Entirely on cow's milk modification	..	..	..	..	..	..	0	..	2	5	3	Lost from observation							
Wood	...	Exfoliative dermatitis	Entirely breast fed	3 daily feedings of cow's milk modification	2	0	0	4	..	0	..	..	3	..	6	..	7	Lost from observation					
Madg.	3½	Lobar pneumonia	Cow's milk modification started 7 days ago; previously was entirely breast fed	Entirely on cow's milk modification	..	..	..	..	..	..	..	3	..	..	6¾	4½	2½	..	½	..	1½	0	
Madg.	3½			1 feeding of egg albumen water	..	6¾	4½	2½	..	½	..	1½	0	..	3	1	Lost from observation						

TABLE II.

BABY	AGE IN MOS.	REMARKS	DIETARY HISTORY	EXPERIMENTAL FOOD GIVEN	Initial % Pres	PERCENTAGE EOSINOPHILES PRESENT ON DAYS AFTER FEEDINGS BEGAN																	
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Morris.	8	Normal	Entirely breast fed	1st day cow's milk modification; 9th day cereal Bid.	0	..	..	0	..	0	..	0	..	10	..	2	..	2½	..	..	5		
Goodm.	¼	Normal	Entirely breast fed	Breast during day; cow's milk modification at night	5	..	6	..	5	..	7	..	10	..	..	3							
Acker.	2	Acute gastro-enteritis	Entirely breast fed	1st day eiweissmilch; 5th day barley water 12 hours	0	..	0	..	0	..	..	5	..	..	3	..	2						
Conn.	...	Pneumonia	Entirely breast fed	Day, breast feedings; night, cow's milk modification	0	..	0	..	1	..	0	..	..	2	..	..	7	..	9	..	..	1	20 day 0
Carrig.	New born	Fractured skull	None	Cow's milk modification	..	0	..	..	3	..	..	8	..	..	4	2	..	3	..	..	0		
Conlon	5	Normal	Entirely breast fed	Breast, 5 feedings; cow's milk modification, 2 feedings	0	..	1½	..	..	1	..	..	9	..	4	..	..	3	..	..	0		
Gregg	2	Normal	Entirely breast fed	Breast, 5 feedings; cow's milk modification, 2 feedings	0	..	0	..	0	..	..	4	..	..	11	..	..	..	..	5	..	..	0
Contos	1½	Normal	Entirely breast fed	Cow's milk modification and breast	..	..	2	..	..	4	..	..	..	8	..	7							

tention was given only to the percentage of eosinophile cells present.

Various combinations of feedings were used, as will be seen in Table I. Breast-fed infants, who had previously been entirely on the breast, were given daily feedings of a simple modification of cow's milk (adding besides water only lactose to the milk). In others barley water or oatmeal water were given. Some of these infants, having previously had a cow's milk modification, were given a sheep's milk modification, or some other food, containing a protein foreign to that particular baby.

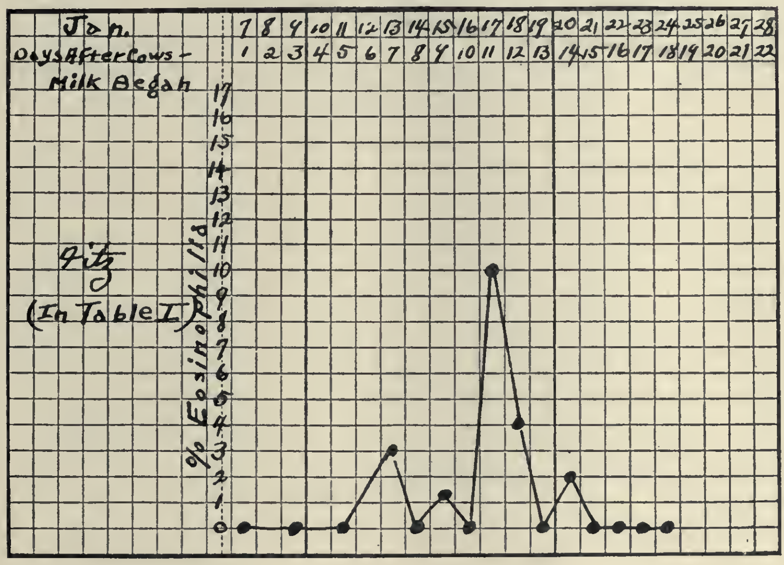
The table gives the dietary history, age, condition and the experimental feedings given in each case. It also shows the percentage of eosinophile cells present in the general circulation on the various days after the feedings began, as well as the percentage present before the feedings were started, where these were obtainable.

For this work the blood was obtained by a puncture of the heel, or the lobe of the ear, and 100 to 150 white blood cells were counted from each stained preparation. The Massachusetts General Hospital preparation of Wright's blood stain was employed in staining the smears.

In conferring with Dr. O. M. Schloss, he suggested that in order to check any error that might possibly have arisen from counting only 100 to 150 cells from each slide, that I follow a second series of cases at Bellevue Hospital. These patients were from the service of Dr. L. E. La Fétra, to whom I wish to acknowledge my indebtedness for the privilege of observations. In these cases the blood smears were prepared as in the earlier cases. Wright's blood stain obtained from Eimer and Amend, of New York, was used, and 500 to 700 cells were counted from each preparation. The results appear in Table II., the arrangement of which is identical with Table I.

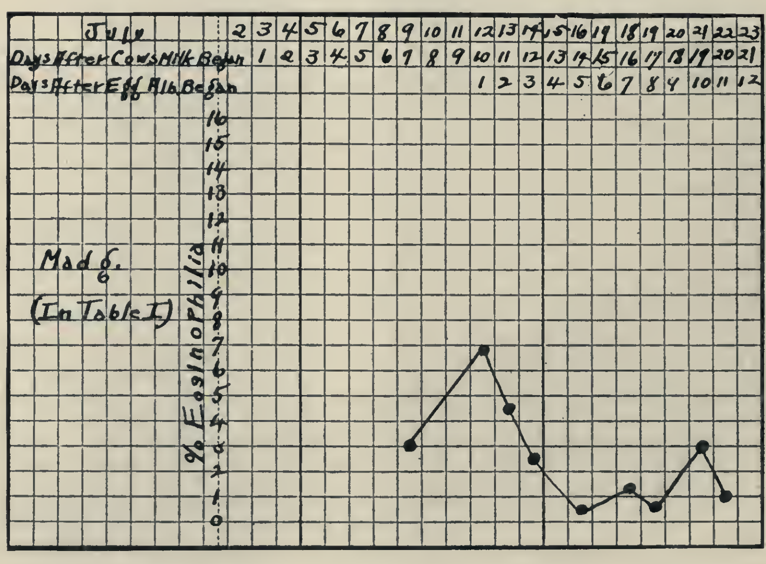
From these tables it will be seen that the rise in the percentage of eosinophile cells, present in the general circulation, following the introduction into the infant's diet of a foreign protein, has followed more or less closely a hypothetical curve. The time of appearance of the highest percentage, and the percentage itself, vary somewhat in each individual case. The count has, however, usually risen rather abruptly on the ninth to the twelfth day, after ingestion of the foreign protein, and has dropped, in a day or two, as suddenly to normal or near normal.

To illustrate this point I am here inserting a chart, showing graphically the curve taken by the percentage of eosinophiles in the case of Baby Fitz. (Table I.), which very closely follows the hypothetical chart. It will give an idea of the general curve, followed more or less closely by the cases in both series:



There were several marked exceptions to this rule. Baby Dol. (Table I.), throughout the observation, showed a rather high and somewhat irregular percentage of eosinophiles in the blood. She had 6 per cent. on the first and second days, after one daily feeding of egg albumin water was started, dropping to 0 per cent. on the third day, and rising to 10 per cent. on the fourth day. She was apparently a healthy infant. Her food had been entirely breast milk from the time of birth until the beginning of this observation. Having been born and constantly resident in the same institution, her feedings had been closely supervised. She may possibly have had a parasitic infection to account for her eosinophilia, though no cause was revealed by careful examination. Neither was I able to account for the early appearance of the eosinophilia (7 per cent.) in the case of Baby Garr. (Table I.), or (5 per cent.) in the case of Baby Goodm. (Table II.)

Another case, that of Baby Madg. (Table I.), was of particular interest, in that it apparently shows a double reaction. This I am also showing in a curve in the following chart:



Baby Madg. was seen for the first time in the out-patient department of the Massachusetts General Hospital on July 6th, and was immediately admitted to the ward with a mild lobar pneumonia, which had apparently been present for several days, and which cleared up entirely shortly after admission. He was put on a simple cow's milk modification on admission, and on July 12th was given a feeding of egg albumen water. I was much surprised to find on the following day an eosinophile cell count of 6¾ per cent.

Close questioning of the mother revealed the fact that the baby had been entirely breast fed until July 3d, when he was started on a simple cow's milk dilution, at home. This was just ten days before our count was made, which showed 6¾ per cent. of eosinophiles. Within four days the percentage of eosinophile cells had fallen to ½ per cent. On July 22d it again rose to 3 per cent. This small rise occurred just ten days after administration of the egg albumen water. It then appears that we have here a double reaction. The rise in the percentage of eosinophile cells occurring on July 13th, probably being due to the introduction into the food of the cow's milk, and that on July 22d due to the egg albumen water. However, a 3 per cent. eosinophilia may not be taken to bear too much significance.

In one point my results do not agree with the observers quoted. In those cases where only a single feeding of foreign protein was given, I found also a small rise in the percentage of eosinophile cells. Whereas, from the experiments of Herrick, and Schlecht and Schwenker, we should expect to find no increase unless subsequent feedings were given.

In summarizing, I might say that when a protein was introduced into an infant's diet, which that infant had never previously ingested (*e.g.*, a foreign protein), there was usually an increase in the percentage of eosinophile cells in the general circulation. As a general rule, this appeared in from nine to twelve days after the ingestion of the foreign protein, and very soon the percentage of eosinophile cells returned to normal, or near normal.

If we may assume from the work of the authors quoted that an increase of the percentage of eosinophile cells in the blood is evidence of sensitization to a protein, the work of this paper is significant. It may find practical application when ordering a diet for an infant at a critical time.

However, further observations will be required to reach any definite conclusions.

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THE INFANT FOR ADOPTION *

BY JOHN B. MANNING, S.B., M.D.
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There appears to be a very real increase in the practice of adopting infants and children. The reasons for this are numerous. The fact that there are many childless marriages and that social agencies are probably better organized now than formerly for placing infants for adoption, appear to be two potent reasons.

Adoption is an old Latin word from *ad* "to," "for," and *optio* "a choice." In law it is the taking of a child of other parents as one's own. This practice, which was common in ancient Rome, was recognized by civil law. It no doubt existed long before this time in practice if not by civil law. One of the earliest recorded adoptions of an infant was that of Moses, by Pharaoh's daughter, about 1500 B.C.: "And the child grew, and she (Moses' mother) brought him unto Pharaoh's daughter and he became her son, and she called his name Moses."† In Athens the power of adoption was allowed all citizens who were of sound mind and who possessed no male offspring of their own. Adoption is not recognized in the laws of England, Scotland or the Netherlands, though there are legal means by which one may be enabled to assume the name, arms and inherit the property of a stranger.‡ In France the rights of adoption are exercised only by those who are fifty years of age and who have no children and who are fifteen years older than the person adopted. In Germany the adopting person must either be fifty years of age, or eighteen years older than the adopted child. Both in Germany and France the adopted child remains a member of his original family, and acquires no rights in the family of the adopter other than that of succession to the person adopting. In the United States, adopttion is regulated by the statutes of several states.

Apart from the sociologic side, which should be of interest to the medical profession, but which is not considered in this paper, is the problem of the physical fitness of the infant as a suitable one for adoption. The court, the social worker, the matron and the managers of the home all have a voice in deciding as to the fitness of the adopting parties to assume their new responsibility. More and more the question of the infant's physical and mental condition is being put squarely up to the physician, and his approval or disapproval is anxiously awaited. We are consulted only because the parents want a healthy baby, and it is clearly our duty, with the best care at our command, to protect them from choosing an infant unfit or diseased before the signing of the court papers makes it their own.

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* Read before the Washington State Medical Association, Seattle, Wash., July 12, 1916.

† Exodus 2-10.

‡ Encyclopaedia Britannica, Eleventh Edition, Vol. I., p. 213.

The large majority of adoptions coming under my own personal observation during recent years have occurred in infancy. Most people want an infant, and often, one soon after birth. The helplessness of a newborn baby appeals to the parental instinct. To see the infant unfold mentally, to share in the formation of its habits and in the foundation of its character and to supervise its physical development, are calculated to bring out the finest qualities in men and women.

The question of heredity and environment repeatedly come up during the discussion of the adopted infant, but will not be gone into in this paper. There is too much mystery and too much taken for granted about the average adoption. The ones adopting have the right to know, by the *most reliable information,* the parents' physical and mental capacities.

If most adoptions occur in infancy, and a great many coming under observation do occur within a few days of birth, what condition should we bear in mind in choosing a baby for adoption?

Malformations—Malformations of the extremities, face, palate, spina bifida, hypo- and epispadias, imperforate rectum and anus, these can all be easily detected.

There may also be arrested development as encephalic or meningeal hernia; these also are easily detected.

Circulatory Disturbances—In view of the fact that in hemorrhagic disease of the newborn, the first indications of spontaneous hemorrhage may not occur until the fourth or fifth day, it would appear wiser not to adopt the infant before the end of the first week.

Congenital structural heart defects without any attempt to classify them further, may be clinically divided into those associated with cyanosis and those possessing no external sign whatever. In the former the diagnosis is evident; in the latter it is usually discovered in a routine examination, with, as a rule, enlargement and a pronounced cardiac murmur. The future of the infant, with the congenitally defective heart is very uncertain and therefore one not to be chosen for adoption.

Infection—A Wassermann reaction is usually asked for and should always be made. Any infant with an easily palpable spleen should be regarded with utmost suspicion, and a second Wassermann is desirable. These things are important, since many infants are adopted before the fourth and seventh weeks, when the clinical symptoms of congenital syphilis are mostly manifest.

The cord should be clean. Umbilical infection with an active organism in the first few days usually causes death in a short time. A low grade infection, however, such as that associated with a granulating cord, may persist a long time and is capable of doing more or less serious damage. I recall an infant for adoption, about three weeks old, perfect except for a granulating stump of a cord, such as we have all seen many times, and I advised adoption. Within one week the left ankle joint was swollen, red, tender and fluctuating. On aspiration there was a large amount of pus withdrawn. The growth was of a pure staphylococcus culture.

All eye infection should first be cleared up.

Nervous Disturbances—Mental deficiency is one of the most vital considerations in the whole group and is usually mentioned by the adopting parties as a thing above all others to be avoided. Most text-books on any classification of anatomic developmental characteristics state that an infant is able to hold up its head by two months. Now, most normal infants can do this long before this time and many at birth are able to do it. As of negative value in eliminating mental deficiency, this fact is of much importance. It is done not by sitting the infant up, but by rolling it over so that the front of the chest is supported by the flat of the hand. Any infant with a history of disturbed breathing within a few days of birth, such as occurs in any injury to the medulla, or with a history of convulsions should not be considered for adoption. The test for mental deficiency as indicated by the inability to hold up the head would in all probability be present in both these latter instances. It is to be remembered that the fusion center in the brain is not always well established in early infancy and that a slight degree of temporary and transitory strabismus frequently occurs.

Digestive Condition—Before proceeding to this subject there is a practical consideration which presents itself in regard to the early feeding of the infant. Another evidence of too much mystery surrounding many adoptions, that the mother can conceal her identity, the baby is not to be nursed on the breast, and everybody concurs, in fact it has already occurred in many instances. The adopting parties should be given more consideration and it is not unreasonable to expect the mother to nurse her newborn baby long enough to give it a start at least.

So far as digestive conditions are concerned there is little to say. There are two very rare congenital anatomic defects, which are so very unusual that in both instances they most evidently indicate serious disturbance, that they need no further consideration. I refer to congenital atresia of the esophagus and congenital obliteration of the bile ducts.

I have seen both pylorospasm and pyloric stenosis in adopted infants. When the adoption has occurred at birth or soon after there are no means by which we can determine whether that infant has a pyloric stenosis existing or in the process of development. It must be considered to be excluded, however, in an older infant.

Genito-Urinary System—Hydrocele in the newborn is an occasional occurrence. Hernia in older infants infrequently develops. I can hardly imagine that these conditions need concern us much. Hydrocele tends to disappear spontaneously as the infant gets older and hernia in a similar manner, although requiring mechanical means to hold it up is disposed of by the deposition of fat as the infant gains in weight. Both conditions are amenable to surgery, if other treatment should not succeed, which, in my experience is not common.

Conclusion—In an infant, for adoption, in the first weeks of life there is a small group of anatomic defects, and diseased conditions commonly existing at this time, which are to be excluded if a normal infant is to be obtained. These are here tabulated for convenience as follows:

(1) Malformation

Extremities, face, palate, spina bifida, hypo- and epispadis, imperforate anus, meningeal hernia, cephalhematoma.

(2) Circulatory
    (*a*) Hemorrhagic disease of the newborn
    (*b*) Congenital heart defects

(3) Infection
    (*a*) Congenital syphilis
    (*b*) Umbilical
    (*c*) Eye

(4) Nervous disturbances
    (*a*) Mental deficiency

(5) Digestive condition
    (*a*) Atresia of esophagus
    (*b*) Congenital obliteration of bile ducts
    (*c*) Pyloric stenosis in older infants

(6) Genito-urinary
    (*a*) Hydrocele
    (*b*) Hernia

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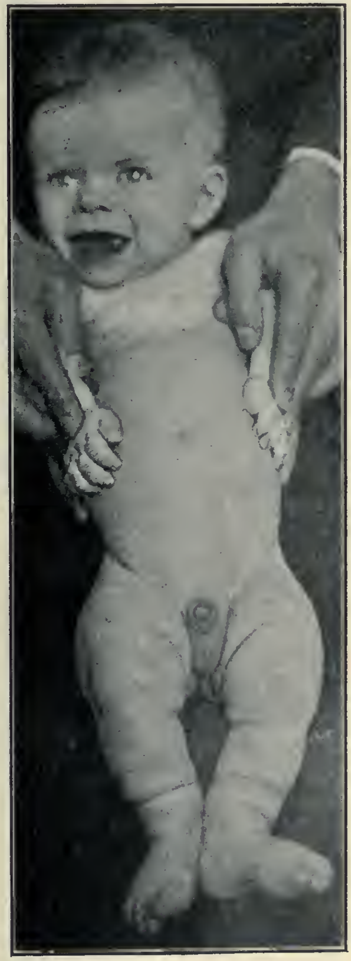
HUMANIZED MILK IN INFANT FEEDING—As a useful food for the average healthy infant who is under the care of the busy general practitioner, J. Epstein (Medical Record, May 29, 1915) recommends the use of the upper 15 ounces of a quart bottle of milk diluted with an equal amount of water. So diluted and with sugar added to make 7 per cent., it has the following percentage composition: protein, 1.70; sugar, 7; fat, 4; salts, 0.35; water, 86.95. This corresponds quite closely with the composition of human milk, which is: protein, 1.50; sugar, 7; fat, 4; salts, 0.20; water, 87.30. Having decided by the weight, age, and general condition of the infant how many ounces of food it requires at each feeding, and the number of feedings in twenty-four hours, the mother is directed to use the upper 15 ounces of 1 or 2 quart bottles of certified raw milk, and out of these 15 or 30 ounces of milk she takes as many ounces as she is directed, and to this she adds an equal number of ounces of cooled, boiled water, to which the proper amount of milk sugar has been previously added. The entire quantity of food which is made up of half milk, half water, and sugar is now equally divided into the number of feedings required and fed at regular hours.—*American Journal of Obstetrics.*

REPORT OF A CASE OF CHONDRODYSTROPHY *

BY JESSE F. SAMMIS, M.D.

New York

This patient was presented for treatment at the Children's Department of the Vanderbilt Clinic on February 28, 1916. *History*—Fourth child of Russian parentage; nine months old when first seen. *Family history*—Negative as to syphilis, tuberculosis or any bone disease similar to this one. The other children are perfectly normal. There are no miscarriages. Labor was difficult and the child was extremely cyanotic and was resuscitated with difficulty. At two months the child had whooping-cough. Has been exclusively breast-fed at intervals of two and one-half or three hours and digestion has been normal. The gain in weight steady, but slow, averaging about 12 ounces a month. Nothing abnormal was noticed about the child until four months of age, when it was noticed that the head appeared to be increasing in size very rapidly and that no efforts were made to sit up, the mother believing that he had a "weak spine." At seven months he was able to hold up his head, but was not able to sit up. *Physical Examination*—Male child; weight, 13 pounds, 6 ounces; appears bright, follows objects, holds up head and sits up



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* Read at the New York Academy of Medicine, Section on Pediatrics, May 11, 1916.

with aid; head appears abnormally large in comparison with the trunk, as do also the extremities. The skin hangs in folds on the extremities as a suit which is much too large. The abdomen is prominent and an umbilical hernia is present. The disproportion between the length of the trunk and the extremities is well marked. Considerable muscular relaxation. Head symmetrical: 46 cm. in circumference; chest, 37 cm.; abdomen, 37 cm. Sutures closed. The fontanel measures 6 x 8 cm. The nose is saddle-shaped and the lower jaw protrudes; the two upper and two lower central incisors are present. Heart, lungs, liver and spleen show nothing abnormal. Wassermann and von Pirquet reactions are negative.

The extremities measure: Upper, acromion to olecranon, 7 cm.; olecranon to wrist, 5.5 cm. Lower, anterior superior spine to condyle, 12 cm.; condyle to ankle, 9 cm.

The hand shows very short fingers of almost equal length. There is an angular separation at the second point, making the trident hand.

Spine—Slight lateral curvature and kyphosis.

Length of body, 61 cm.; crown of head to umbilicus, 35 cm.; umbilicus to sole of feet, 26 cm.

The case exhibits a classical picture of chondrodystrophy.

272 West Ninetieth Street.

ACUTE OTITIS MEDIA IN INFANCY AND CHILDHOOD—W. R. P. Emerson (Boston Medical and Surgical Journal, 1915, Vol. CLXXIII., p. 616) records 5 cases to represent the most common types of aural complication. In none of the 5 cases were there symptoms of earache. In 2 cases the symptoms were abdominal, in 1 meningeal, and in 2 general, associated with fever. In all of these cases the diagnosis of acute otitis media was made by routine examination of the ear drums. These cases are used to emphasize the fact that in every case of contagious disease and of affections of the respiratory tract, measures should be inaugurated at once to keep the nasopharynx clear and to maintain drainage through the Eustachian tube. In such cases the ear drum should be inspected at every visit of the physician. An electric ear instrument gives a clear picture of the drum with a minimum disturbance of the child.—*American Journal of Obstetrics.*

A BRIEF REPORT OF SIXTY-EIGHT BLOOD EXAMINATIONS IN INFANCY, WITH A REVIEW OF THE RECENT LITERATURE OF THE BLOOD IN INFANTS *

BY H. M. MCCLANAHAN, M.D., AND A. A. JOHNSON, M.D.
Omaha, Neb.

The work embodied in this paper has occupied a period of several months. Nearly all the infants were residents of the Child Saving Institute. This institute received children for care and adoption. It is primarily a home, not a hospital. The infant ward contains never less than 30 infants under six months. They are being received and discharged constantly. No infant included in this list was in the institute for a less time than one month. None that presented any evidence of syphilis or other infection was included in the list. After doing a certain amount of preliminary work the writer made a careful search through the current literature to determine what had been done in this line. Before presenting the work done by Drs. Johnson and Moore, I present the following brief abstract. In this work the writer was materially assisted by Miss Ruth Warner, a senior student. We limited our study to current periodicals for the years 1910 to 1915 inclusive, and the following publications were carefully examined for any articles upon the blood of infants for the above period:

Boston Medical and Surgical Journal
ARCHIVES OF PEDIATRICS
American Journal Medical Sciences
American Medical Association Journal
American Journal Medical Research
Johns Hopkins Hospital Reports
American Journal Diseases of Children
Journal of Infectious Diseases
Medical Record
London Lancet
Journal of Experimental Medicine
Pediatrics
Journal of Pathology and Bacteriology
Archives of Internal Medicine
British Medical Journal
British Journal of Diseases of Children

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* Read before the American Pediatric Society, meeting held in Washington, D. C., on May 8, 9, 10, 1916.

We believe our abstract will be found to comprise all articles concerning the blood in infants. With the exception of one article, all are from American or English literature. In the above journals there were a number of abstracts from both foreign and English literature that are not included in this review.

"Blood Platelets of Newborn," Boston Medical and Surgical Journal, Vol. CLXVI, No. 12, pp. 448 to 452. Morse.

Platelets were counted in 12 normal infants during the first nineteen days of life, at least one count being made for each day, and usually more. Counts at birth varied from 100,000 to 412,000. If the count was extremely high at birth it decreased in a few days and *vice versa*, so that all infants after a week showed 350,000 to 450,000. There was no correlation between the weight of the child and the number of platelets. Three babies, aged four, two and eleven days respectively, showing idiopathic icterus showed a marked increase in platelets, which reached a maximum as jaundice cleared away. Two cases of hemorrhagic disease of the newborn were studied. In the first there was bleeding from umbilicus, nose and stomach, with hemorrhagic spots on roof of mouth and skin; it was treated with rabbit serum; its recovery was accompanied by rapid increase of platelets (from normal count), which reached a maximum on the eleventh day; the erythrocytes and hemoglobin were only slightly reduced; leukocytes were slightly increased. The second had no serum, but recovered with a like increase of platelets, which reached a maximum on the thirteenth day; this case, however, was marked by anemia and the blood regenerated only slowly; it also had a slight leukocytosis. A platelet count made on a case of dermatitis exfoliativa neonatorum the day before its death showed 4,729,000 erythrocytes, 57,000 leukocytes, 279,000 platelets, 80 per cent. hemoglobin. A case of pemphigus foliaceous neonatorum showed 658,000 platelets, 16,000 leukocytes; four days later, during improvement, 524,000 platelets, 40,000 leukocytes. Morse drew these conclusions: Platelets vary in number at birth exceedingly, but are uniformly numerous and do not vary so much after the first week (350,000 to 450,000). Platelets increase in icterus neonatorum; in hemorrhagic diseases of the newborn there is no diminution at the onset, but a post-hemorrhagic increase with a late maximum; in skin lesions of infants the count may go higher or lower according to the condition of the child.

"Blood of Newborn Infants," American Journal of Medical Science, 1910, Vol. CXL., p. 598. Editorial.

Since one of the arguments against the regenerative and in favor of the degenerative nature of basophilic granules in the erythrocytes has been the frequent failure to find them in the blood of newborn infants and in human embryos, König has reexamined the field with the following results: Basophilic granules are found both in newborn infants (4 to 5 per cent. of cases) and in human embryos (twice in 6 cases). Nucleated red cells were found in 92 per cent. of newborn babies examined.

"Sugar Content in Blood of Nurslings," American Journal Diseases of Children, Vol. I., p. 441. Abstract. S. Cobiliner.

This author shows by examination of the blood of a number of infants that nurslings normally have a much greater sugar content in the blood than adults; that in cases of exudative diathesis there is hyperglycemia; that in dyspepsias and intoxications the blood sugar content is not increased; that in cases of decomposition or putrefactive disturbances in the intestines there is hypoglycemia, which gradually reaches the normal as patient improves. In so-called cases of "salt fever" there may be hyperglycemia.

"Epinephrin in the Blood of the Newly Born," Journal of American Medical Association, 1883, Vol. LXIV. Cannata.

Cannata obtained constantly negative results in 31 healthy babies whose serum was tested for epinephrin by various technics.

"Anti-Infectious Power of the Blood of Infants," Journal of Infectious Diseases, 1910, Vol. VII., p. 698. Ruth Tannicliffe.

The results of Tannicliffe's experiments on 24 infants and children, ranging in age from birth to three years, indicate that at birth the opsonic power of the blood serum toward streptococci, pneumococci and staphylococci is a little less than that of adult serum. It falls still lower during the first months of life, and does not equal the opsonic power of adult serum until about the second year; that the phagocytic activity of the leukocytes of infants toward streptococci, pneumococci and staphylococci follows a course similar to that of opsonic indices. The leukocytes at birth are a little less active than adult leukocytes. Their activity diminishes considerably during the first months of life and does not reach that of adult leukocytes until about the third year; that the phagocytic power of the whole blood of infants drops decidedly during the first and second months of life and does not reach that of adult blood until about the third year; that during the first and second years of life the anti-infectious power of the blood as measured by the opsonic power of the serum and the phagocytic power of the leukocytes is far below that of adult blood; that these results are in accord with Holt's statistics, showing that during the first months of life when the death rate is highest the anti-infectious power of the blood is lowest. Holt's figures referred to are: 20 per cent. to 25 per cent. of all deaths are of infants under one year, and that 55.1 per cent. of the deaths at this time are caused by bacterial diseases.

"Bacteriology of the Blood in Early Life," American Journal Diseases of Children, 1911, Vol. I., p. 193. Churchill and Clark.

In the article Delestre is quoted as having examined the blood of 21 premature infants, of whom 19 died; 15 of the fatal cases showed organisms in the blood, the order of frequency being streptococcus, colon bacillus, staphylococcus, pneumococcus. The author's results from blood cultures in infants, made postmortem, are as follows: Twelve days infant, staphylococcus aureus coli, few streptococci; eight months infant, staphylococcus; four months infant, three organisms resembling in all respects streptococcus pyogenes, staphylococcus aureus and diplococcus lanceolatus; four months infant, negative; three months infant, staphylococcus aureus, streptococcus pyogenes; six months infant, staphylococcus albus; five months infant, staphylococcus albus; three months infant, streptococcus; three months infant, streptococcus; six months infant, negative. The author recommends that more blood cultures be made in infants, as such good results have occurred in adults.

"Blood Cultures During Life in Infants and Young Children, with Description of New Technic," American Journal Diseases of Children, 1912, Vol. IV., p. 197. Wollstein and Morgan.

These authors claim that blood for bacteriologic examination is readily obtainable from the external jugular vein in infants as young as ten days. Their figures are as follows:

Age	Organism	Age	Organism
7 months	Streptococcus	9 months	None
7 months	None	10 days	None
4½ months	None	2 months	Streptococcus
5 months	None	8 months	None
8 months	Pneumococcus	8½ months	Klebs-Loeffler
2½ months	None	6 months	Pneumococcus
3 months	None	12 months	None
10 days	Aurococcus	10 months	Pneumococcus
8 months	None	6 months	None
9 months	None	2 months	Streptococcus
9 months	Pneumococcus	7 months	Streptococcus
4½ months	None	6 months	Pneumococcus
7 months	None	10 months	None
9 months	None	9 months	Pneumococcus
11½ months	None	5 months	None
6 months	Streptococcus	2½ months	Pneumococcus
9 months	None	8 months	None
9 months	Pneumococcus and B. Influenzæ	3 months	None
2½ months	Pneumococcus	5 months	Pneumococcus
4 months	None	12 months	None
6 months	None	7½ months	None
10 months	None	7 months	None
5 months	Pneumococcus	2 months	None
9 months	Pneumococcus	7 months	None
2½ months	None	7½ months	None
		2 months	Streptococcus

"A Comparison of Leukocytes and Lymphocytes," Journal of American Medical Association, 1914, Vol. LXII., p. 1,261.

Polymorphonuclear leukocytes are endowed with proteolytic ferments, and oxidases; the lymphocyte is without either of these; both, however, carry an equal amount of iron.

"Normal Percentages of Different Variations of Leukocytes in Infants and Children," Archives of Internal Medicine, 1910, Vol. VI., p. 638. Schloss.

Schloss quotes the following percentages of eosinophilia averaged from examination of 5 one month to six months old infants and 5 six months to 12 months old infants who were not acutely ill, had hemoglobin more than 50 per cent. and who suffered from no condition recognized as a cause for eosonophilia. For infants 1 month to 6 months old, maximum percentage of eosinophiles, 9.35 per cent.; minimum, .35 per cent.; average, 3.59 per cent. For infants six months to 12 months old, maximum, 2.85 per cent.; minimum, 0; average, .76 per cent. These findings indicate remarkable oscillation. He states that Rosenstern found the eosinophiles above 3 per cent. in none of 6 normal breast-fed infants, but that in artificially-fed infants the percentages varied from .7 per cent. to 4 per cent. Schloss' own figures are as follows, each figure representing the result of five separate counts:

	Polymorphonuclear neutrophiles	Lymphocytes	Large Mononuclears and Transitionals	Polymorphonuclear eosinophiles	Mast cells
AGE TWO DAYS TO TWO WEEKS					
Maximum ..	40.2%	55.9%	16.2%	9.7%	0.5%
Minimum ...	26.6	47.9	5.1	3.0	0.0
Average	31.9	52.2	9.0	6.0	0.1
AGE TWO TO FOUR WEEKS					
Maximum ..	37.5	61.9	13.4	6.8	0.8
Minimum ...	19.5	51.3	3.6	2.6	0.0
Average	29.2	55.6	9.7	4.5	0.4
AGE ONE TO TWO MONTHS					
Maximum ..	37.4	59.1	13.2	7.3	0.9
Minimum ...	22.3	51.1	10.3	5.0	0.1
Average	29.7	51.3	11.7	6.0	0.4
AGE TWO TO SIX MONTHS					
Maximum ..	33.4	65.8	13.5	4.5	0.6
Minimum ...	19.5	54.3	6.4	1.0	0.0
Average	25.9	60.0	10.9	2.5	0.3
AGE SIX TO TWELVE MONTHS					
Maximum ..	35.9	58.5	12.2	4.5	0.8
Minimum ...	24.6	50.5	7.3	0.0	0.1
Average	30.4	55.9	9.6	2.6	0.4

The highest percentages were in infants from two days to two weeks old. He calls attention to the pronounced variations in percentages of the different varieties of leukocytes in apparently normal infants, and that there is a uniform increase of polymorphonuclear cells and decrease of lymphocytes with advancing age. In apparently normal infants the eosinophiles were frequently above the percentages normal for adults, but rarely above 5 per cent. and never above 6 per cent.

"Leukocyte Counts During Digestion in Bottle-fed Infants," American Journal Diseases of Children, 1915, Vol. IX., p. 358. Mitchell.

Mitchell studied 50 bottle-fed infants, making more than 700 blood counts, 38 of which children were under one year. The method of study was to make a leukocyte count immediately before feeding, one immediately after feeding, one fifteen minutes after feeding, one a half hour after feeding, one an hour after, one an hour and a half after, and so on every half hour until next feeding. This group of counts constitute a series. Of this series he reports 120. The infants were all bottle-fed and, while not exactly normal, were of the type usually seen in a hospital, ready for discharge. They were all a little under weight. The results of his study show that leukocytosis occurred constantly after feeding in only 12 per cent., although in 32 per cent. it occurred occasionally, and in 56 per cent. leukopenia occurred constantly. In the 120 series, 28.3 per cent. showed leukocytosis and 68.3 per cent. leukopenia, leaving 3.3 per cent. so irregular as to be indeterminable. The decrease is greatest at from one to two and one-half hours after feeding, and tends to rise before next feeding. When increase does occur it is most frequently soon after feeding and begins to decline in a half hour. Crying, struggling, and chilling of the part from which the blood is extracted increase the count.

"Leukocyte Counts in Pneumonia and Cerebrospinal Meningitis," Abstract in Journal of American Medical Association, 1914, Vol. LXII., p. 328. Hess.

Hess reports marked leukocytosis with moderate but absolute lymphocytosis in all his cases of epidemic meningitis; the neutrophile predominated before the administration of serum; eosinophiles disappeared early in the infection, but recurred as convalescence set in; at no time did there exist marked eosinophilia. Leukocytosis in pneumonia varied as to severity of infection and resistance of patient; young infants which reacted well showed neutrophilia and moderate lymphocytosis before the crisis; neutrophiles decreased in number after crisis.

"Blood Picture in Early Diagnosis of Measles," Abstract in Journal of American Medical Association, 1914, Vol. LXII., p. 644. Lucas, San Francisco.

Lucas says that a reversal of the blood picture normal to infants usually occurs about a week before any visible symptoms of infection, such as coryza, Koplik's spots or coughing, occur; that such a reversal is always present at least forty-eight hours before these symptoms. The picture normally, he says, shows 50 to 70 per cent. lymphocytes, 25 to 30 per cent. neutrophiles, 8 to 15 per cent. large mononuclears. Although there is actual diminution of the number of neutrophiles, there is relative increase, due to the still more marked leukopenia which precedes the physical signs of measles by eight days. Accompanying this change is an ever-increasing number of disintegrated cells, with abundant granulations separating from the nuclei.

"Diagnostic Value of Blood Examination in Pertussis," American Journal Diseases of Children, 1911, Vol. I., p. 431. Kolmer.

Kolmer in this article gives, in passing, a summary of blood examination of normal institutional children, which he considered a normal standard after examining the blood of a large number of institutional children and which he used for comparison in examining the blood of unknown children of similar age. For the age of three months to one year it is: leukocytes, 10,000; large lymphocytes, 45.57 per cent.; small lymphocytes, 13.53 per cent.; transitionals, 2.02 per cent.; polymorphonuclears, 36.78 per cent.; eosinophiles, 2.13 per cent.; mast cells, .07 per cent.

"Anemia in Infants," Abstract in Journal of American Medical Association, 1911, Vol. LVII., p. 1,648. Finkelstein.

Finkelstein remarks that some infants whose pallor would suggest anemia show a normal blood count and picture; but that some infants are born without the normal reserve of iron which in normal infants bridges over the nursing period until iron-containing food is included in a general mixed diet. This most frequently occurs in premature infants, in twins, or in the progeny of anemic neuropathic mothers. He believes that pseudoleukemic anemia of infants is an extreme type of secondary anemia from toxic or infectious causes in children with congenital debility of blood-producing organs, and that its prospect, therefore, for cure is good if said infant is kept in pure air and free from complications with proper care and diet.

"Myelogenous Leukemia in an Infant Nine Months Old," Journal of American Medical Association, 1915, Vol. LXIV, p. 2,167.

Mason, of Baltimore, reported a case of a nine-months-old girl with leukocytosis of 200,000, atypical granulations seen with neutrophilic myelocytes as well as eosinophilic and basophilic myelocytes. There was no enlargement of glands or spleen; no necrosis nor hemorrhage of mucous membrane. Course of disease was three weeks.

"Acute Lymphatic Leukemia in an Infant," Archives of Pediatrics, Abstract in Journal of American Medical Association, 1911, Vol. LVI., p. 620. Veeder.

Female infant, seventeen months old, had the highest leukocyte count Veeder was able to find in lymphatic leukemia of childhood. Count was: leukocytes, 1,330,000; erythrocytes, 3,370,000; hemoglobin, 55 per cent.; lymphocytes, 98.5 per cent.; polymorphonuclears, 1.2 per cent.; myelocytes, 3 per cent.

Emerson's Text on Clinical Diagnosis, 1913.

Gundobin, Carstarjen and Warfield report that on the first day after birth the average leukocytosis is about 26,000; on the third day, 13,270; on the eleventh day, 15,740; the first few days occurs an absolute increase in the polymorphonuclear neutrophiles (70.42 per cent. the first day, 53.16 per cent. the second day, 34.2 per cent. the eleventh day); the large mononuclears and transitionals are high, being 10.76 per cent., 16.67 per cent., and 15.98 per cent. respectively on these three days; the eosinophiles vary much; mast cells and myelocytes are rare; the count as usually considered normal for infants (40 per cent. small mononuclears) does not occur until the eleventh day This leukocytosis has been explained as a concentration of the blood, or a digestion leukocytosis, but the more rational explanation is the rapid blood formation at this age. Although normal infants vary much, yet this rather high count may continue until from the third to the sixth year. During these early years the small mononuclears carry from 40 to 60 per cent., the polymorphonuclear neutrophiles from 18 to 40 per cent., with often a slight increase in eosinophiles. Digestion leukocytosis is greatest in the infant after his first meal of cow's milk; for the nursing infant it is said to be absent.

Wood's Text on Chemical and Microscopical Diagnosis, 1911.

In children under one year the relationship of mono- to polymorphonuclear cells is often inverted (as compared to that of adults), being about two to one. During the nursing period the average number of red cells is higher than in adults, being about 5,580,000, with a maximum during the first week of life. Physiological variations in successive counts are frequently met with in nurslings, fluctuations of a million cells being occasionally found. The hemoglobin is high for a few days after birth, and then sinks, so that it is lower in the first year of life than later, and also shows considerable variation, the percentage varying from 58 per cent. to 78 per cent. In infants during the first few days after birth the specific gravity undergoes rapid fluctuations between 1.06 and 1.08, probably due to venous stasis at the time of delivery and the chilling of the body afterward. The density of the blood does not correspond either with the hemoglobin or with the number of corpuscles. After this time the variations are less irregular and in the first few months the specific gravity fluctuates between 1.055 and 1.059. During the first few days after birth the leukocytes may reach 15,000 to 19,000, while in the nursing period they average 12,000. In the blood of healthy nursing infants up to the age of about eight months it is possible after prolonged searching to find occasional nucleated red cells of two types—one in which the cell is about the same size as that of the normal red cell, usually with a pycnotic nucleus and an orthochromatic cell body; the other from two to four times as large as the normal red cell and with a polychromatic cell body and a nucleus showing a distinct chromatic network. During the nursing period the relative proportion of the lymphocytes varies from 51 per cent. to 59 per cent., while the proportion of neutrophiles is about 28 per cent. From the eighth to the tenth month an increase in the absolute and relative number of the lymphocytes is noticeable, the proportion rising to 61 per cent. After the tenth month a fall is again noted to 56 per cent., the neutrophiles slightly increasing during this period to 34 per cent. Transitional neutrophiles are present during during the first few months up to about 11 per cent., but fall gradually to about 7 per cent. by the end of the first year. The eosinophiles vary from 7.5 per cent. to .5 per cent. during the nursing period. The large lymphocytes are usually more abundant than in adults.

Gulland and Goodall, in their Text on the Blood, 1912.

At birth the number of red corpuscles is very high, about 6,000,000 per c.mm. Hemoglobin is also high, being about 120 per cent.; not infrequently the color index tends to be high from the fact that the corpuscles, like those of fetal life are larger than in adult life. There is slight variation in the size of red cells and in some healthy infants there may be a slight degree of polychromasia. Nucleated red cells (normoblasts) are always present in the circulation of infants for some time after birth. They are quite numerous the first hours, gradually diminish and are difficult to find after seven days. The polycythemia soon disappears and normal count is reached in two weeks. Hemoglobin falls gradually throughout infancy to about 80 per cent. Leukocytes at birth are numerous, about 18,000; increase a little for two days, may reach 30,000, then rapidly decrease to about 10,000 by the first week, after this they again increase. At eight months they are about 15,000; at twelve months about 10,000. The variations of the first week are variations of polymorphonuclears, which may reach a maximum of 70 per cent. and fall to 20 per cent. During the remainder of infancy and until the fourth year the lymphocytes predominate, being about 60 per cent. This percentage is still higher if development be delayed or nutrition impaired. The leukocytes are more responsive to stimuli in infants than in adults.

As the result of our study of the foregoing literature. we decided to limit our work to the relative percentages of the white cells, as there were only two articles dealing with this particular phase of the subject. The first one by Schloss (Archives of Internal Medicine, 1910, Vol. VI., p. 658). He calls attention to the pronounced varieties in the percentage of the different varieties of leukocytes in apparently normal infants. This is in line with our experience. His percentage of eosinophiles averaged higher than in our series. As it will be noticed that in a number of infants none of these cells appeared. Second, Mitchell (Journal of Diseases of Children, 1915, Vol. IX., p. 358). This author studied the leukocyte count during digestion in bottle-fed infants. He studied 50 infants making a count every half hour after every feeding until the next feeding. His conclusions were that leukocytosis occurred constantly in only 12 per cent. of the cases. In 32 per cent. it occurred occasionally, and in 56 per cent. leukopenia occurred constantly.

The laboratory work was done by Professor A. A. Johnson, M.D., Instructor in Bacteriology, Medical Department, Nebraska University, and Clyde Moore, M.D., Instructor in Pediatrics. The work of the writer consisted in the examination of the infants before the tests were made and also keeping them under observation for at least two weeks afterward, to determine the physical condition of the infants. Dr. Johnson made counts on 51 infants and Dr. Moore on 30 infants, making a total of 81, ranging in age from three weeks to one year. From this there are eliminated 10 infants upon whom the count was made by the above, Drs. Moore and Johnson, each working independently of the other. Three others were eliminated because they showed symptoms of acute infection three days after the blood count, leaving a total of 68. It will be noticed that there is a wide discrepancy between the count of the large and small lymphocytes by the two observers. This is due to the fact that Dr. Johnson called all white cells small that had a small amount of cytoplasm without regard to the size of the cell, after the manner of Pappenheim, while Dr. Moore assumed that all white cells not larger than a red cell were small, without regard to the amount of cytoplasm. All of the above infants were in average health at the time of the blood was taken; that is, they were gaining in weight, had normal stools and were free from any evidence of acute or chronic disease. All were bottle-fed infants; all received modified milk made from certified milk.

Method of Procedure—The method of procedure was simply to make a puncture, procure a drop of blood upon the slide, at once spread by means of another slide, then dry and stain with Jenner's stain. The differential count of the whites was then made by passing the slide across the field of the objective, the count being made in series of 100. The result of the examinations of Dr. Johnson and Moore appears as follows:

The following 44 counts were made by Dr. A. A. Johnson:

	Small Lymph.	Large Lymph.	Polys.	Trans. Eos.	Eosin.	Age
Violet	20	44	28	8		11 months
Billy	12	31	40	7	2	9 "
Dorothy	21	38	31	8	2	2 "
Indian No. 1	16	31	49	4		9 "
Thurston	28	39	29	4		12 "
Carak	18	37	41	3	1	2 "
Charles	30	36	32	2		11 "
Viola	20	49	21	8	2	11 "
Henry	25	30	40	3	2	12 "
John	19	35	39	7		3 "
Indian No. 2	22	38	35	5		5 "

	Small Lymph.	Large Lymph.	Polys.	Trans. Eos.	Eosin.	Age
Billy	20	31	40	8	1	9 months
Leslie	48	20	22	9	1	3 “
Robert	16	41	33	8	2	4 “
Elmer	24	36	37	3		12 “
Anderson	14	39	41	6		6 “
Edward	19	31	43	7		1 month
Anna	27	40	30	3		2 months
Martha	19	29	40	2		12 “
Eva	23	31	37	8	1	3 “
Mary	19	40	38	3		3 “
Isabel	16	26	48	8	2	3 weeks
Helen	27	43	26	4		1 month
Evelyn	22	28	43	5	2	4 months
Naomi	30	26	34	7	3	12 “
Morris	14	41	35	7	3	12 “
Ramona	22	41	27	9	1	2 “
Roy	12	32	46	7	3	1 month
Wama	25	41	30	4		1 “
William	33	48	34	5		12 months
Rosy	15	55	23	7		8 “
Abe	20	57	17	6		3 “
Leroy	32	29	38	7		12 “
Edward	21	46	28	4		6 “
Lesley	14	33	43	8	2	4 “
May	21	42	28	9		3 weeks
Joe	19	51	25	5		12 months
Ardeth	26	43	24	7		2 “
Allen	36	41	19	4	1	12 “
Abner	20	33	41	5	1	3 “
Ira	40	18	29	12	1	4 “
Hudson	22	33	39	4	2	6 “
Westley	28	36	27	9		2 “
Private	25	32	41	2		6 “
Morgan	14	65	25	3	1	12 “
Stanley	36	31	28	4	1	9 “
Stanford	10	50	35	5		9 “
Lewis	15	65	15	5		12 “
Christie	22	54	20	4		12 “
Monroe	22	51	17	10		7 “
Furnas	14	60	20	16		8 “

The following 17 counts were made by Dr. Clyde Moore:

	Small Lymph.	Large Lymph.	Polys.	Trans. Eos.	Eosin.	Age
Leo	3	66	22	3	6	10 months
Ardiff	35	12	49	2	2	2 "
Iola	70	11	15	1	3	2 "
Ramona	80	7	10	1	2	2½ "
Theodore	80	4	10	4	2	2½ "
Cecil	74	4	15	6	1	4 "
Emma	84	5	6	2	3	4 "
Abraham	70	5	21	4		3 "
Bobbie	62	5	30	2	1	12 "
Eddie	88	2	8	2		6 weeks
Marian	62	9	23	6		3 "
Alvin	77	4	13	2	4	2 months
Eleanor	75	8	13	1	3	2½ "
Ellen	62	5	22	3	3	6 weeks
Marie	64	14	16	2	4	3 "
Ray	59	7	29	3	2	1 month
Rupert	82	2	15			3½months

On the above list no infant was under three weeks of age or over twelve months.

In view of the fact of the variation of the counts of the large and small lymphocytes between the two observers, we have grouped the large and small in one class.

Dividing into groups we have the following results:

RECAPITULATION

Age	Cases	Lymph.	Polys.	Trans.	Eosin.
Under 2 months	20	64	28	5	1
2 to 4 "	17	69	25	5	1
4 " 6 "	3	60	35	5	
6 " 8 "	3	55	40	4	
8 " 10 "	4	52	41	5	2
10 " 12 "	14	64	31	5	

Conclusions—No new facts were developed. The result of our work shows that the blood of the infant varies from that of the adult in the high proportion of the lymphocytes. On May 1st and 2d Dr. Johnson made a second count on 14 infants in both lists. Comparing these with the first slides of the same infants, we find a considerable variation, so that the blood of the infant varies from day to day in its relative proportion of white cells. Second, there is a gradual but irregular increase in the polymorphonuclear cells during the first year of life.

Brandeis Building.

Method of Securing Bony Ankylosis of the Spine in Pott's Disease by Means of a Bone Transplant—This is described by A. E. Halstead (Journal of Surgery, Gynecology and Obstetrics, 1915, Vol. XX., p. 18) as follows: With the patient in the lateral prone position, an incision beginning on the median line above the kyphos is curved around this prominence and terminates below at the median line. An incision is made along the lateral aspects of the tips of the spinous processes and extended for a distance of two vertebræ above and two below the diseased vertebræ. With a sharp chisel the soft tissues, including periosteum and the erector spinæ muscles, are separated from the lateral surfaces of the spinous processes well down to the vertebral arch. After retracting outward, the tissue is separated from the spinous processes, the spines are sawed through at their bases, one above and one below the kyphosis. A bone transplant is removed from the tibia in the usual way. The transplant is of sufficient length to reach from at least one vertebra above the diseased bones to one below. It is fashioned so that it will have periosteum on one lateral surface and on one border. From the lateral surface the periosteum is reflected back to the border to which the periosteum is attached. The patient is placed in the prone position and the transplant inserted between the cut surfaces of the divided spinous processes. The border of the transplant to which the periosteum is attached is toward the side from which the soft tissues have been retracted. The transplant is held in place by replacing the retracted, detached spinous process, and secured by passing heavy chromicized catgut sutures through the periosteum of the detached spinous process, the periosteum of the free margin of the transplant, and then through the periosteum at the base of the spinous process. The spine is immobilized by means of a plaster-of-paris molded splint for ten weeks.—*The American Journal of Obstetrics.*

RUPTURED APPENDIX FOUND AT AUTOPSY IN AN INFANT SUFFERING FROM COLON BACILLUS INFECTION OF THE URINARY TRACT

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Many cases of appendicitis occurring in infancy have been reported. That the disease at this early age is not exceedingly common, however, may be judged from Holt's autopsy records of 2,000 cases in which not a single diseased appendix was found. H. C. Deaver's youngest patient in a series of 500 cases of appendicitis in children was twenty-one months old. Nevertheless, the disease may occur at any age, and it is not because of its rarity that this case is reported.

Unquestionably the earlier the age the more difficult the diagnosis. Deaver's advice to "regard all cases of abdominal disturbance as appendicitis until proven otherwise" is good, but as this case shows, the diagnosis may be obscured by the fact that the cause of the disturbance had apparently been proven otherwise.

I find no record of a case in which pus in large amount has been found in the urine and in which cultures of the urine have demonstrated the colon bacillus, occurring during an attack of acute appendicitis.

Schrager,[1] reports a case in a boy of three, who, on the fourth day, developed a severe cystitis which masked all symptoms, also a child of twelve with pus-loaded urine and a very marked suprapubic tenderness.

John Thomson[2] speaks of the frequency of bladder symptoms in appendicitis in childhood, and Deaver includes cystitis among the various diseases from which appendicitis in children must be differentiated, but none note the simultaneous occurrence of appendicitis with a colon bacillus infection of the urinary tract.

The patient, a boy fifteen and one-half months old, had an exceedingly good history. He had been very carefully fed, was well nourished and apparently in perfect health up to within three days of his death. The family history was good, with no apparent predisposition to the disease. An older child had some difficulty with its early feeding.

The baby's only previous illness was a severe inflammation of the prepuce some months before.

On April 4th the baby vomited in the morning, was given milk of magnesia by the mother and after a movement of the bowels had seemingly completely recovered.

He was first seen in the late afternoon of the 5th, had again vomited, was somewhat exhausted and had a moderate elevation of temperature with slightly labored breathing which made one suspicious of pneumonia. Nothing definite was noted upon examination. A soda enema was given and a specimen of urine was procured on the following morning. This specimen was acid and contained large quantities of mucopus. Some abdominal distention and general tenderness were noted on the 6th, but were attributed to the "obvious misery" so characteristic of pyelitis.

The treatment consisted of potassium citrate in solution, and this was retained, although food was at times vomited. A second specimen of urine, obtained some hours after the citrate treatment was instituted, was found to be alkaline, and to contain less pus.

No real uneasiness was felt until the morning of the 7th, when the vomiting became severe and obstructive in character, the distention increased. The child died at noon.

Autopsy revealed free pus in abdomen; appendix ruptured near its distal end; a fecal concretion, said to be rare in infancy, above the point of rupture; apparently normal kidneys and an empty, slightly congested bladder. The pathologist reported cultures of colon bacilli from both specimens of urine.

Although colon bacillus infections are comparatively rare in boys, they do occur. Appendicitis is conceded to be more frequent in boys. That the appendix was the original seat of the trouble and that the urinary tract became infected through the blood stream, seems probable. The history of infection of the prepuce some months before throws some evidence in favor of an extending infection along the urethra and primary bladder involvement.

Morse has reported 2 cases of pyelitis following circumcision, and John Thomson one. The finding of so large a quantity of pus in the urine so early in the appendicular attack, leads to the belief that the condition of the bladder may have existed for some time.

The case teaches, I believe, a very valuable lesson—the importance of the appendix as a factor in the production of disease at any age. This had been emphasized many times, but is still hardly appreciated. The symptomatology was here at least misleading. Vomiting may occur as a symptom of practically all diseases of infancy. The bowel action was not characteristic, the baby was not markedly constipated and had he been, it would have meant little.

There was some suppression of urine, but this occurs as well in pyelitis or cystitis. General tenderness is characteristic of colon bacillus infection. Fever and rapid pulse are seen in both, and labored breathing is quite characteristic of pyelitis.

With, therefore, such distinct urinary findings, I can hardly see how the complete diagnosis could have been arrived at except by accident. The possibility of such complication should, however, be impressed upon the mind.

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DIFFERENCES IN DIGESTION IN ADULTS AND INFANTS—In the study of J. F. McClendon (Journal of American Medical Association, 1915, Vol. LXV., p. 12) the acidity of the stomach and reaction of the duodenal contents was measured by means of hydrogen electrodes. Indicator papers were calibrated so that clinicians may determine hydrogen ion concentrations approximately. After a normal meal, the acidity of the adult stomach reaches its maximum in from two to three hours, the rise in acidity being more rapid the lighter the meal. The height to which the acidity rises varies with the individual, the highest observed in a normal individual being 0.1 normal (about 0.4 per cent. of pure hydrochloric acid). The hydrogen ion concentration of the duodenal contents is 0.00000002 normal. This is slightly alkaline, since that of pure water is 0.00000011 at 25°C. (77°F). The acidity of the infant's stomach rises slowly after the milk begins to leave it, and four hours after nursing may be the same as some normal adult stomachs. That of the gastric juice of the newborn is 0.005.—*American Journal of Obstetrics.*

THE USE OF SALT SOLUTION BY THE BOWEL (MURPHY METHOD) IN INFANTS AND CHILDREN

BY EDWIN E. GRAHAM, M.D.
Philadelphia

The Murphy method of injecting normal saline solution by slow proctoclysis has been used for a few years past in adults suffering from many other diseases and conditions than peritonitis, and by medical practitioners as well as by the surgeon. My experience with it in the treatment of certain conditions in infants and children has led me to believe that it is of much more value to the pediatrist than most of us are aware of.

Although originally suggested by Dr. Murphy as an aid in the treatment of peritonitis, its advantages in all toxic conditions soon became manifest, since it was observed that when a patient with peritonitis was given salt solution by slow proctoclysis not only did the peritonitis subside, but there was a marked lessening of the toxemia. The latter effect is due to the fact that the large quantity of fluid absorbed dilutes the toxins circulating in the blood, and thus acts as a diuretic, promoting their elimination from the body.

For this reason it has been most successfully employed in the highly toxic states of typhoid fever. In early pneumonia, too, it appears to afford great relief, but in the later stages, after the heart has been affected by the toxemia, the blood pressure has become high, and there is obstruction in the lungs, it must be used with the greatest caution.

In the acute infectious diseases toxemia may be greatly influenced by the employment of the Murphy drip, and in diphtheria and scarlet fever the resulting dilution of the toxins is of the utmost value in averting nephritic complications. In uremia and suppression of urine slow proctoclysis promotes diuresis, and thus dilutes the highly toxic and irritating materials which would otherwise be harmful to the kidneys.

Generally speaking, in toxemia from any cause, whether it be an autointoxication, mineral poisoning, or septicemia, the judicious use of salt solution by the bowel will prove of great value in treatment.

If nephritis with edema is present, the administration of salt solution by this method is, in my opinion, unwise; although, in a few such cases, it has apparently been successfully employed. Further experience in such cases is necessary before its value can be considered proven.

It has recently been used with benefit in adults suffering from alcoholism with delirium, and its use before and after etherization has been suggested.

Since nephritis in children is induced by toxins in the blood, we have in slow proctoclysis not only a prophylactic, but a curative measure as well; for by the dilution of the toxins acidosis is decreased, the activity of the kidneys is re-established, and improvement follows.

I have been greatly impressed, although not surprised, by the excellent results following the Murphy treatment in profuse diarrhea due to intestinal infection and in the summer diarrhea of children, the symptoms being greatly relieved when the fluid lost by the bowel was replaced. Its use in dysentery is being more widely adopted each year, while in Asiatic cholera Michael found that 40 per cent. of the cases treated with saline infusions recovered, while only 22 per cent. of those not so treated showed any improvement.

A loss of body fluid from persistent vomiting or any other cause can be replaced in whole or in part by normal saline solution, injected into the bowel and then absorbed. We find, too, in slow proctoclysis an invaluable aid in the treatment of cyclic vomiting, pylorospasm, pyloric stenosis, and esophageal stricture, although in the two conditions last mentioned nutritive enemata must sometimes be given alternately with the injections of salt solution in order to maintain the nutrition.

My experience with the Murphy method in treating pylorospasm has been very gratifying, and in the case of a twenty-five days' old infant with severe jaundice, persistent vomiting and diarrhea, the stools being largely composed of mucus, which was black, the employment of the Murphy method, as a last resort, was followed by speedy recovery.

Fischer has had occasion to employ the Murphy treatment in erysipelas, and advocates its use when there is marked toxemia and high fever. It has also been used in typhus fever.

I regard the infusion of normal saline into the bowel by the drop method as a most valuable aid in the treatment of all the exhausting diseases of infancy and childhood, and believe that by its stimulating effects threatened collapse can often be averted. In feeding children and infants who cannot retain nourishment given by mouth, a nutrient enema give drop by drop is often better retained and absorbed than when given more rapidly.

Sugar solution has recently been given by proctoclysis in cases of diabetic acidosis, in an effort to promote continuous absorption, and in some instances the acidosis absolutely disappeared.

Lesné administers artificial serum by proctoclysis, giving 50 to 100 c.c. of isotonic serum, or 4 per cent. of sugar solution, and claims that absorption is afterward as rapid as when these fluids are injected subcutaneously. He also reports excellent results in children of all ages suffering from gastroenteritis, cyclic vomiting, acute alimentary anaphylaxis, and typhoid fever. He states that, in those cases where urotropin or epinephrin was added, the action of the drug was better by rectum than when given by mouth.

Proctoclysis in puerperal fever and in surgery is familiar to all in the profession; but experience has shown that it is even more effectual in the treatment of surgical conditions in children than in adults. Not only does it greatly relieve post-operative thirst and nausea, but after hemorrhage from the esophagus, intestines or lungs, and when operative or traumatic hemorrhage has produced only mild symptoms, the absorption of large quantities of saline solution from the bowel quickly replaces the fluid lost by hemorrhage.

The Method—There are three essential points in giving salt solution by the Murphy method: First, the solution must be under very low pressure; second, there must be a free to-and-fro movement between the reservoir and the rectum; third, the solution must be warm when introduced.

To guard against too great pressure on the fluid, the reservoir containing it should not be elevated more than 12 inches above the hips, and the tube carrying the fluid to the rectum should be compressed so that the solution will trickle into the rectum drop by drop, a half-pint escaping in this manner each hour. The hips should be slightly elevated, and a medium-sized catheter may be introduced four or five inches into the bowel, or a glass tube may be used.

To secure the ready absorption of the fluid, the solution should be at a temperature of 98° to 100° F. when it enters the rectum; as it cools it is taken up less quickly by the bowel, and at 60°F. absorption is much retarded. Since the solution cools while passing from the reservoir to the rectum, the fluid in the reservoir should be kept at a temperature of at least 110°F., this being accomplished by surrounding the irrigation jar with hot-water bags. A pint of solution is placed in the reservoir every two hours, and, at the end of an hour, when one-half of it has trickled into the bowel, the flow is checked for an hour, so that the bowel may have a rest.

Where there has been great loss of fluid, it may be necessary to inject the saline much more rapidly.

One must be careful, however, not to overdistend the bowel, for, although distention is the normal condition of the intestine, overdistention will expel the solution.

It is also possible to give by this method so much fluid that it will produce general edema and pulmonary congestion. Therefore, whenever slight edema of the tissues is noted, the treatment should be discontinued until this disappears, when, if necessary, the infusions may be very slowly resumed.

The preparation of the saline solution is a matter of no little importance, although it frequently receives but little consideration. The usual custom is to dissolve a teaspoonful of table salt in a pint of water, which is, at best, an extremely inaccurate method of calculating, since a teaspoonful may be from 100 to 300 grains, according to whether it is a level or heaping teaspoonful.

In addition to the dram of sodium chloride, some authorities dissolve a dram of calcium chloride in each pint of solution. Recently the use of ordinary tap water has been suggested in place of normal saline, since it is quite as readily absorbed, and in high fever, or whenever the rectal temperature is high, relief has been afforded by injections of tap water unheated.

The length of time proctoclysis should be continued varies with the aspects of the case. In children, especially, it depends upon how they tolerate the presence of the tube within the rectum. In infants the mere fastening of the tube to the buttocks with adhesive strips will suffice; but older children must be persuaded to allow the tube to remain, for it may be so annoying that a sick child will try to pull it out.

The usual duration of this treatment is from four to six days; but if the rectum is not unduly irritated, and the indications warrant it, proctoclysis may be kept up with interruptions for ten days to two weeks.

The history of the child, twenty-five days old, mentioned in the text, is of unusual interest.

February 7th, 1916. Baby G., aged twenty-five days. Jaundice at the age of one week, and has gradually become more marked. Frequent vomiting. Takes very little breast milk. Birth weight, 9 pounds; present weight, 7 pounds and 14 ounces with diaper on. Voids very small amounts of high-colored urine.

February 11th. Nausea, vomiting, retching and nystagmus; jaundice intense. Weight, 7 pounds, 8 ounces. Stool consists almost entirely of dark mucus. At times the head is retracted and spine arched. Passes very small amounts of high-colored urine. Child dull, drowsy and appears to be very ill. Salt solution by bowel (Murphy's method) begun.

February 12th to 17th. Vomits less. Passes more urine. Takes more breast milk.

February 18th. Looks better. Nurses well, *i.e.,* five minutes every two hours by day; is also given three night feedings. Passes more urine of a normal color. Stools average three daily; are small, dark and contain much mucus. Weight, 7 pounds, 12 ounces. Jaundice less marked. Retains more salt solution.

February 22d. Less jaundice. Not so drowsy. One stool, dark in color, containing considerable mucus.

February 26th. Now nurses for ten minutes at each time.

March 13th. Stools contain more fecal matter.

March 20th. Jaundice almost gone. One stool daily, almost normal in color and consistence. Weight, 8 pounds, 7½ ounces.

May 12th. Aged four months. Weight, 13 pounds, 2 ounces. One stool daily; no vomiting. Nurses fifteen minutes at a time. Appears to be normal.

A specimen of urine and a stool examined February 11, 1916, showed the following:

Specimen of Urine—Urine saturating napkins shows a trace of bile.

Specimen of Feces—

MACROSCOPIC

Consistency	Semisolid
Color	Yellowish brown
Odor	Fetid
Mucus	Small amount
Pus	No gross detection
Blood	No gross detection
Parasites	None

MICROSCOPIC

Crystals	None
Food remnants	None
Mucus	Positive
Cells:	
Epithelial	None
Leukocytes	Considerable
Erythrocytes	Few
Ova and parasites	None

CHEMICAL

Blood	Positive
Bile	Very faint trace

MILD DIABETES IN CHILDREN—D. Riesman (American Journal of Medical Science, 1916, Vol. CLI., p. 40) says that the fatality of diabetes in early life is an axiom. However, an increasing number of observations seems to show that juvenile diabetes need by no means be a mortal disease. Reporting 4 illustrative cases, he says that there exists a mild type of diabetes in childhood and adolescence. The disease is peculiar in its tendency to occur in several members of the same family. The glycosuria is usually moderate, although nervous excitement and other disturbing factors may augment it. Other diabetic symptoms are often slight and may be wanting. The disease is not progressive and may remain stationary or end in apparent recovery. In its general features, it corresponds to the so-called renal diabetes.—*American Journal of Obstetrics.*

SOCIETY REPORT

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS

Stated Meeting, Held May 11, 1916

ROYAL STORRS HAYNES, M.D., IN THE CHAIR

REPORT OF A CASE OF CHONDRODYSTROPHY. FROM THE VANDERBILT CLINIC

DR. JESSE F. SAMMIS presented this report. (See p. 755.)

AUTO SERUM TREATMENT OF CHOREA

DR. ABRAHAM GOODMAN presented this communication. (See ARCHIVES OF PEDIATRICS, September number.)

DR. SAMUEL FELDSTEIN, of Brooklyn, said that at the Brooklyn Jewish Hospital they had recently treated a case of chorea by Dr. Goodman's method with most amazing results. This patient was a girl, thirteen years of age, who two months previously had begun to suffer from rheumatic polyarthritis, which necessitated her stay in bed for three weeks. After ten days' relief she was again compelled to take to her bed on account of the recurrence of the articular symptoms. Three days previous to her admission she was seized with severe choreic movements, these being so violent at the time of admission that a thorough physical examination could not be made. Her temperature was 100.4°F., pulse 120 and respiration 26. There were signs of a mitral regurgitation. After observing the patient for three days and being compelled to give dionin in ⅛-grain doses at night for the extreme restlessness, the child's condition became aggravated. They then removed 40 c.c. of blood from an arm vein and kept it at room temperature, allowing the serum to separate spontaneously. Most of the serum was clear, the remainder was centrifuged. They then removed 20 c.c. of clear fluid from the spinal canal and injected 10 c.c. of the serum. Following the injection there was considerable reaction, rise in temperature to 102°F., headache and rigidity of the neck. These symptoms disappeared the following day. The day after, the choreic movements were greatly decreased, and by the third day had largely disappeared. A week later the injection was repeated, this time allowing the serum to separate spontaneously at room temperature over night. The second treatment was followed by a much milder reaction. A few days later the patient was practically free from spontaneous choreic movements, and had remained so up to the present time.

Dr. Charles H. Smith said he had seen the case of chorea to which Dr. Goodman had referred and that if he had cured that case he had performed a miracle, for it was the most severe case of chorea he had ever seen. Every attempt had been made to alleviate the condition of that child. She had received maximum doses of salicylates, bromides, chloral, arsenic and tonics, and it scarcely seemed possible that she could be cured.

Dr. Rudolph D. Moffett said he had been associated with Dr. Goodman at the German Hospital and had observed this treatment and he could only say that it worked wonderfully. After injecting a case it cleared up within a few days. They had been using 10 c.c. in making the injections, and he thought they should use 15 c.c., and that they might thus avoid the necessity of giving a second injection.

OBSERVATIONS ON TUBERCULOSIS AT THE VANDERBILT CLINIC

Dr. Charles H. Smith and Dr. H. Lambert Bibby presented this contribution, which was read by Dr. Smith. He said that when a child was brought to them for examination there were two questions which they always asked: (1) Has the child been infected with tuberculosis? This question was answered by the skin test. (2) Is the infection latent or active? The terms latent and active were preferable to infection and disease, since they were more accurate and since all infection meant disease. An active tuberculosis in a child was not like incipient tuberculosis in the adult. In the child the lesion was not apical, often not pulmonary, but by node or hilus infiltration. This made diagnosis extremely difficult and quite different from making a diagnosis in the adult. The diagnosis in the child was made on symptoms of impaired nutrition and anemia, undersize, and failure to gain in weight at the proper rate. The presence of an irregular fever lasting over a considerable length of time was very suggestive. Other symptoms that were valuable were anorexia, fatigue, languor, headache and night sweats. In some instances the fever seemed to incite the child to unusual activity. In children cough and positive chest signs were rare, but there might be transient bronchitis, asthmatic bronchitis, or enlarged bronchial lymph nodes. A latent tuberculosis was shown by a positive von Pirquet test and no symptoms or signs of the disease. The frequency of these various symptoms in a series of 80 cases giving a positive von Pirquet reaction were as follows: Fever in 16 cases; no gain in weight in 9; loss of weight in 7; failure to gain when at rest in 3. Among these 80 cases, 21 or 25 per cent. had tuberculosis in the active stage and all were without the signs of the disease. With reference to the von Pirquet test there were several points to be observed. It was better to perform the test with a scarifier, as one was less likely to draw blood in this way. The skin should be properly sterilized before making the inoculation and should be allowed to dry before the dressing was applied. A protective dressing should be applied to protect the puncture from contamination from clothing or finger nails. They had found physical signs in the lungs in only 21 out of 150 cases, and these consisted in slight changes in the breath sounds. Dullness was difficult to detect and uncertain. The physical signs detected in these 21 cases were transient localized râles at the apex, with a positive von Pirquet in 1 case; localized râles in the axilla in 3 cases, 2 with a negative and 1 with a positive von Pirquet; general bronchitis (accidental) in 2 cases, 1 giving a positive and 1 a negative von Pirquet; asthmatic bronchitis in 5 cases, all positive; pleurisy in 4 cases, all positive; consolidation with cavity formation in 4 cases, 3 giving a positive and 1 a negative von Pirquet reaction, and 2 cases with pertussis. This gave 14 per cent. in 150 cases in whom there was a probability of tuberculosis; the larger number of these gave a positive von Pirquet reaction, but some gave a negative reaction. The signs of involvement of the bronchial lymph nodes were dullness, tender spine and Despine's sign. Enlarged bronchial lymph nodes and infiltration of the hilus caused an increased conductivity of the sounds, but this sign was not pathognomonic. There was some confusion as to just what was meant by Despine's sign, and it was better to say whispered bronchophony to a given vertebra than to say Despine's sign positive. There were certain points to be observed in eliciting Despine's sign. The room must be quiet; the sign could not be elicited where persons were walking about and talking. The child must be able to whisper well; it was of course impossible to get the coöperation of a child under the age of three or four years. It was well to listen high in the cervical and low in the dorsal region and then to continue to listen above and below until the point was reached, at which one heard the vesicular sound. This point varied considerably in different subjects. The X-ray, in making a diagnosis, was either a brilliant aid or a great disappointment. In order to get information one must get a good X-ray with a short exposure. When there was a positive tuberculous infection the X-ray might show enlarged bronchial nodes, or tracheobronchial involvement by large central shadows, or small nodes might be shown along the main bronchi. Small, dark shadows well separated from the root shadows were very suspicious. Pleural thickenings might be noted which were interlobar or from old pleural effusions or infiltrations. There might be a fibrosis extending out from the hilus region, but it must be remembered that there were variations in the hilus shadows normally present. The X-ray might show consolidation or cavities, but it had been found that the cavities were much smaller than the signs would indicate. In regard to treatment, it might be said that children with latent tuberculosis needed watchful care, extra rest, air and food. Children with symptoms of active disease should be put to bed in the open air with careful feeding and kept in bed until the temperature became normal. They must be watched for months and years in order to detect any signs of relapse. At the present time there were insufficient preventoria and sanatoria. All children with positive von Pirquet reactions needed careful watching; if such a child ran a temperature it should be considered as needing the same care and treatment as an active case of tuberculosis. At the present time our sanatoria took only children from homes in which there were members with tuberculosis, but made no provision for the child accidentally infected from some other source.

Dr. Franklin Morris Class said he agreed with everything that Dr. Smith had said. He saw many of his patients at the Vanderbilt Clinic Day Camp and saw what he had accomplished. The most difficult cases to diagnose were the early cases of tuberculosis in children under twelve years of age. He was also convinced that most children suffering from early tuberculosis showed no signs in the lungs; and those cases showing pulmonary signs generally suffered from an infection other than tuberculosis. It was especially difficult to make a diagnosis in a dispensary, as one had to see each case over a considerable period of time.

Dr. Leon T. LeWald said the problem of making a diagnosis of early tuberculosis in children was just as hard for the roentgenologist as for one who based his diagnosis on physical signs. There might be a small focus in a bronchial gland which the X-ray did not readily show. As to Despine's sign, there was considerable variation in the vertebræ and that explained the difficulty in the location of the sounds. It was also difficult to determine the presence of a small focus, as the shadow of the cross section of a bronchus might be mistaken for an enlarged gland. It was advisable to have stereoscopic radiographs not only in one plane, but taken at different angles, at right angles and at oblique angles.

Dr. Maurice Fishberg said that an important point had been omitted in the discussion of the Despine's sign. In interpreting the findings in tracheophony we must bear in mind certain anatomical peculiarities of the bifurcation of the trachea, mainly according to the age of the patient. In infants under three years of age the bifurcation was on a level with the seventh cervical vertebral spine, but with advancing age it sank lower and lower. At the age of eight years it was on a level with the third dorsal vertebral spine, and at twelve years of age it was as low as the fourth dorsal spine. In adults it might be as low as the fifth or even the sixth dorsal vertebral spine. Under the circumstances the sign was positive in a child under three years, when tracheophony was heard lower than the first dorsal vertebra; in a child of six the sign was negative when tracheophony was audible above the third spine. In a child of twelve tracheophony might be audible as low as the fourth or fifth dorsal spine without enlarged thoracic glands. It many children this sign was negative though the glands were enlarged because the trachea was situated more anteriorly than normally, or only the anterior glands were tuberculous. After all, the sign was due to the interposition of anything between the trachea and the spine, and tuberculous glands were the most common in childhood. In adults we might find tracheophony on rare occasions as low as the lumbar vertebræ with or without being able to assign a plausible cause to the phenomena. In children, if these anatomical points were not borne in mind, the sign was of little value.

Dr. L. Emmett Holt said that with regard to the von Pirquet reaction in tuberculous meningitis, he thought the impression had gained currency that it was only exceptionally that one got a positive von Pirquet reaction in that disease. It had been their experience that except in the last stages of the disease, when the patient was extremely prostrated, the skin test had almost been positive. At other times a negative test might be of great value. This was illustrated in the case of a child who was admitted to the hospital because the mother had noticed a lump on the head. This proved to be a bulging fontanel. There was a history of convulsions, fever and drowsiness. A lumbar puncture was done and 120 c.c. of perfectly clear normal fluid withdrawn. In this instance the von Pirquet test was negative and the child recovered. The symptoms in this case pointed to tuberculous meningitis, but the child certainly did not have that disease. It probably belonged to that type of meningitis sometimes called serous meningitis. As to Despine's sign, Dr. Holt said he had been impressed by the extreme variability of the sign in different children. He did not believe it was possible to fix on any one point and say that this was the exact point at which the whispered voice was significant. It was a valuable sign for diagnosis and was usually best obtained on the right side. Early wasting was often absent with active tuberculosis in infancy. One might see a child with fairly positive signs of tuberculosis and yet the child would show no loss of weight for a considerable time, and a child might have a fairly active tuberculosis and even gain weight. Loss of weight in young children was not so significant of tuberculosis as in older ones. Most of the children with tuberculous meningitis were rosy and plump up to the time when active symptoms of meningitis developed.

Dr. Abraham L. Goodman said that one point that had impressed him was the difference in tuberculosis in the very young children and those between the ages of ten and twelve years. He had been amazed to see how well nourished these young children were, and how extensive the tuberculosis often was without any particular objective sign. In older children these objective signs were usually present. Most of these younger children had enlarged bronchial lymph nodes and the von Pirquet reaction was usually positive. These cases of early tuberculosis exhibited indefinite fevers accompanied by gastrointestinal disturbances, and were treated often as such until the condition was recognized. Every case of indefinite fever in early life should be looked upon as a possible tuberculosis and, with the added refinement in technique and execution in detail of X-ray examination, the early appreciation of tuberculosis was made possible. When one found enlarged mediastinal glands, together with a von Pirquet reaction and an increased temperature from time to time, one was justified in making a diagnosis of incipient tuberculosis. When such children were placed under proper hygienic and sanitary conditions, and given daily doses of guaiacol and arsenic for years, they could be permanently cured. Guaiacol and arsenic not only had a favorable influence on tuberculous processes in the lungs, but had a direct influence on the process of metabolism.

DR. CHARLES H. SMITH, in closing the discussion, said that with reference to Despine's sign, it was difficult to get a child under two years of age to whisper; one could not usually get a child under three or four years of age to whisper properly. By the time a child was three or four years of age the bifurcation of the trachea was approximately as far down as at the age of twelve years. There must be some significance in this sign, as one gets it as low as the fourth or sixth dorsal vertebra and, on the other hand, there were a large number of cases in which it stopped at the first dorsal or seventh cervical vertebra. Undoubtedly it did occur without the presence of tuberculosis, but the figures with reference to its occurrence were certainly suggestive.

SEX DISTRIBUTION IN RICKETS—In the routine examination of school children of the ages of five to six and eight to nine, 75,268 in number, and about equally divided between the sexes, J. Priestley (British Journal of Children's Diseases, 1915, Vol. XII., p. 173) noted marked signs of rickets in 2.04 per cent. of the boys and 1.13 per cent. of the girls. During three years of this five-year period even traces of rickets were recorded. The percentage then became 27.3 for boys and 16.3 for girls, bearing out, however, the greater prevalence among males.—*American Journal of Obstetrics.*

DEPARTMENT OF ABSTRACTS

ORIGINAL CONDENSATIONS OF CURRENT PEDIATRIC LITERATURE
BY THE EDITORS AND THE FOLLOWING ASSOCIATES

Charles E. Farr	New York City
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COATES, GEORGE MORRISON: THE VACCINE TREATMENT OF SUPPURATIVE OTITIS MEDIA. (Annals of Otology, Rhinology and Laryngology, December, 1915, p. 785.)

In acute cases, when appropriate treatment fails to produce expected results and the aurist is justified in continuing the waiting policy, then vaccines should be given consideration. No untoward results have been experienced in the author's cases in giving over 1,000 injections, except in one instance, where the vaccine was found not to be sterile. The pus should be obtained fresh from the middle ear after proper cleansing of the canal. The dose must depend on the conditions of age, size and type of organism used. The initial dose for adults is 500,000,000 staphylococcus, bacillus pyocyaneus, or diphtheroids, and from 30,000,000 to 50,000,000 of other organisms. This dose is reduced to about one-sixth for a child under three years. The injection is given once in three or four days, increasing each time, so that a slight reaction is obtained. Stock vaccines, while not ideal, may be used while waiting for autogeneous ones to be made.

The author's first case was in a three-year-old child, who had an otitis of two days' duration. Incision of the drum released pus and, though there were symptoms of mastoid involvement, operation was refused and the condition continued for three weeks, when an autogenous vaccine was made and all symptoms disappeared after the second dose.

Another case of a boy of eight years, with a history of a discharging ear for two weeks. Four doses of a commercial vaccine cured him.

In a series of 17 cases of acute and subacute otitis treated with commercial vaccines and no other treatment except paracentesis, there were 100 per cent. cures in a short time.

In chronic cases one must take into consideration that some of these go for varying lengths of time with dry ears, yet vaccine treatment has given better results than any one other kind.

S. W. T.

MORSE, JOHN LOVETT: D'ESPINE'S SIGN IN CHILDHOOD. (American Journal of Diseases of Children, April, 1916, p. 276.)

Professor Morse reaches the following conclusions in regard to D'Espine's sign (whispered bronchophony as diagnostic of tuberculous bronchial glands in children): (1) The normal change in the voice occurs between the seventh cervical and the first dorsal spines. (2) D'Espine's sign is present, therefore, when the bronchial voice, or whisper, is heard below the seventh cervical spine. (3) D'Espine's sign is uncommon in children of the well-to-do classes. When it is present in them, it is probably not a manifestation of tuberculosis in more than 50 per cent. These conclusions are based on a study of 666 children.

H. R. M.

NOVARO, N.: INTUSSUSCEPTION CAUSED BY ASCARIDES. (Policlinico, March, 1914.)

Novaro reports 2 cases of this very rare condition. The first, a child of five, showed a tumor in the region of the cecum. Laparotomy revealed a mass of ascarides filling the duodenum, and an invaginated section of intestine about 6 cm. long, in which were also a large number of worms. This last was easily reduced and the patient made an uneventful recovery.

The second case was a child fourteen months old, artificially-fed and very much constipated. A purge produced a bloody discharge. A large mobile tumor showed at the epigastrium, very rapid pulse and tympanites. Operation showed an invagination in the cecum containing ascarides in great numbers. Patient recovered.

Novaro attributes the intussusception to spasmodic contractions caused by irritation rising from the presence of the parasites.

C. D. M.

CLARKE, T. WOOD: CAN PNEUMONIA IN CHILDREN BE ABORTED? (New York State Journal of Medicine, November, 1915, p. 445.)

Because of the better control of diarrheal diseases and the acute contagions, pneumonia has become of greater relative importance as a cause of death and yet the treatment allows it to still very largely run a self-limited course. This investigation covers more than 30 cases in private and consultation practice, and the pushing of hexamethylenamine has seemed to give prompt and gratifying results in all but 1 case, an infant of four months with bronchopneumonia. If marked improvement does not occur in twenty-four hours one should look sharply for empyema or other complications. For children about seven years old, gr. ij in water or milk may be given each two hours and the ingestion of water pushed; with the greatest care hematuria or strangury may occur, only to quickly disappear when the drug is stopped and sodium bicarbonate given. The same treatment given from the onset of measles, influenza and whooping-cough seems to do much good. This preliminary report is made in the hope of inducing others to break away from "masterly inactivity" in the care of children with pneumonia. W. L.

FRAZIER, CHARLES H.: TYPES OF HYDROCEPHALUS: THEIR DIFFERENTIATION AND TREATMENT. (American Journal of Diseases of Children, February, 1916, p. 95.)

All abnormal accumulation of fluid within the ventricles is due to a loss of balance between secretion and absorption, caused either by an obstruction to the outflow of the fluid from the ventricles, by delayed or defective absorption, or by hypersecretion. The author discards the old classification into internal and external hydrocephalus, as with this terminology the internal means the obstructive form, while the external means any other variety. He suggests a new classification having a physiological background with direct clinical application. He divides it into (1) hydrocephalus non-absorptus, (2) hydrocephalus obstructivus, (3) hydrocephalus occultus, and (4) hydrocephalus hypersecretivus. In hydrocephalus obstructivus there is mechanical obstruction of the cerebrospinal fluid from one or more ventricles into the subarachnoid space. This may be due to a congenital defect or, more frequently, is the result of adhesions from a pre-existing inflammatory lesion. In hydrocephalus nonabsorptus, absorption is delayed or defective. Whether this is due to the cutting off of part of the subarachnoid space by adhesions, to a toxic substance in the fluid which prevents its absorption by the venous blood stream or to an abnormal condition of the agents is still uncertain. Hydrocephalus occultus is characterized by an excess of fluid in the ventricles, basal cysternæ and sometimes throughout the subarachnoid space without any increase in the cranial dimensions. Hydrocephalus hypersecretivus is an excessive accumulation of fluid due to hypersecretion. The author believes this to be due to a hyperactivity of the cells of the choroid gland. Whether this is due to a pathologic condition of the gland itself or to a toxic substance in the fluid coming in contact with the plexus is uncertain.

The author has found that in the obstructive type the absorption of phenolsulphonephthalein from the subarachnoid space and the excretion by the kidney is practically normal. In the nonabsorptive type the time of appearance of the dye in the urine is delayed and the amount secreted in a two-hour period is low.

In the treatment of the hydrocephalus obstructivus the author suggests the puncture of the corpus callosum, which provides an outlet into the subarachnoid space where the fluid may be absorbed. In the non-absorptive types he recommends the establishment of a drainage tract into the pleural cavity. In the hypersecretive type he advises thyroid feeding. It has been found that thyroid invariably acted as a depressor on the choroid plexus and reduced the secretion of the cerebrospinal fluid. C. E. F.

BRAISLIN, WILLIAM C.: A CASE OF TERATOMA OF THE TONSILLAR SPACE: REMOVED FROM A BOY TWO DAYS OLD. (Annals of Otology, Rhinology and Laryngology, December, 1915, p. 807.)

Infant with difficulty in breathing and inability to nurse. Its color rather cyanotic. The left tonsil had the appearance of enormous hypertrophy. The growth was smooth, rounded and showed no crypts. The soft palate was displaced upward and to the other side. Large blood vessels were seen over the surface of the tumor. On account of these large vessels the base of the growth was tied off with two strands of catgut without the use of a needle. The pressure of these ligatures served to diminish the size of the growth and the breathing became easier at once. On account of the probability of hemorrhage, the removal *in toto* was postponed until the next morning, when the whole tumor was removed by use of the cold wire snare. Hardly any bleeding ensued; the soft palate assumed its normal position and the child's color became a healthy pink. Shortly afterward, it was able to nurse without difficulty. The pathologist's report showed cartilaginous masses, extraneous glandular tissue and angiomatous tissue and the diagnosis was teratoma.

S. W. T.

CARRAU, A.: VACCINOTHERAPY IN GONOCOCCIC INFECTIONS IN SMALL GIRLS. (Revista Med. del Uruguay, February, 1915.)

The gonococcus vaccine prepared by Nicolle and Blaizot was employed in treating 15 girls in an orphan asylum. The condition of these children, ranging in age from five to twelve years, had not been improved by any previous treatment. All presented local irritation and discharge of pus from vagina, but no symptoms of abdominal complications. From ½ to 1 c.c. was administered hypodermically in some cases with a decided reaction. At first the discharge was increased, but subsequently much improved. The number of doses given ranged from two to eight, at intervals of four days at first, gradually increased to a month. In 2 cases only the gonococcus disappeared entirely, the patients being pronounced cured. The remaining 13 children continued to improve until the injections were discontinued, on account of too pronounced reaction after each dose. C. D. M.

HERRICK, J. F.: ENLARGED THYMUS IN INFANCY. (Journal of Surgery, Gynecology and Obstetrics, March, 1916, p. 332.)

Enlargement of the thymus gland often causes death directly or indirectly. It is a question whether the pressure is exerted solely on the trachea or upon other organs as well. The chief symptom of a thymic enlargement is a respiratory disturbance which simulates a foreign body in the trachea. This is in the form of a mild stridor both at inspiration and at expiration, or it may be a very severe dyspnea with fatal termination. After fits of vomiting, coughing or crying there seems to be a few minutes of relief. Pressure on the trachea, on the vagi, on the vessels and on the heart are assigned as causes of death.

The diagnosis of the stridor caused by an enlarged thymus, and that caused by a foreign body, may be made from the more gradual onset, slowly increasing difficulty, absence of foreign body in the X-ray, dullness to the side of the sternum and an enlarged gland in the X-ray shadow.

It is nearly impossible to differentiate from an enlarged thymus, an enlargement of the mediastinal glands. In an enlarged thymus dullness is usually higher up. The thymus case is usually well nourished, although pale and pasty looking, without a history of tuberculosis. Slight elevation of temperature and cachexia often suggests tuberculosis in a thymus case.

The author reports 6 cases, which range in age from four weeks to three years. In 2 cases first symptoms appeared one week after birth, 1 at two weeks, 1 at two and one-half months, 1 at one year, and 1 at three years. Death resulted in 2 cases under symptomatic treatment; 1 was living under symptomatic treatment, but in poor condition; 3 cases were treated with X-ray and are well.

The X-ray treatment appears to be the most satisfactory and the safest method. In these cases the dose was about one-fourth an erythema dose as measured by the Holzknecht radiometer. For the first week treatment was given every day, then every two or three days, and later twice weekly. Extirpation is both dangerous and uncertain. C. E. F.

Southworth, Thomas S.: Experiences with Malt Soup for Institution Marasmus. (New York State Journal of Medicine, September, 1915, p. 345.)

Following an epidemic of respiratory troubles in the wards many of the infants had digestive trouble, with green and white stools and loss of weight. Careful readjustment of the usual mixtures failing to bring about improvement, it was necessary to do something quickly to avoid a number of deaths. Malt soup was selected, from previous experience, as offering the most promise and no attempt was made to follow any stock directions, as the idea was to use it to helpfully modify formulæ that were adapted to the individual cases. One tablespoonful each of wheat flour and malt soup extract was used for each 10 ounces of total food, the mixture was brought slowly to the boil, then strained, cooled and bottled; in private practice it is often better to cook the mixture for thirty minutes. As life prolongers and savers the malt-soup mixtures succeeded in nearly all instances and in many instances moderate gains promptly ensued. Both the chemical processes and absorption are spread over a greater length of intestinal surface and bring into play new ferments and absorptive areas, thus accounting for the improvement that comes from this type of feeding. The changing from one di-saccharid to another cannot possibly do the good that is accomplished by the mixed carbohydrates, maltose, dextrin and starch. The effect on vomiting was usually favorable. Malt-soup extract is no longer very expensive and in the quantities used by institutions need not exceed the cost of milk sugar for the same feedings. This type of feeding is brought forward only as a desirable addition to our armamentarium in handling such cases and not in any way as an exclusive method of feeding. W. L.

McNERTHNEY, J. B.: FRACTURE OF THE JAW IN CHILDREN AND THE IMPORTANCE OF PRESERVING THE SIX-YEAR MOLARS. (Northwest Medicine, 1915, p. 359.)

Fracture of the maxillary bones or alveolar borders in children are among the most common fractures in the whole body. The six-year molars are the natural corner-posts of the face and skull during the period when the deciduous teeth are being replaced by the permanent ones. If these are removed there is anteroposterior shortening in the maxillæ, changes in the skull and nasal passages. If extraction is necessary the space should be blocked.

The author states that many of the mouth-breathers of childhood and of early adult life are due to the injury and loss of the alveolar processes containing tooth buds, or are due to the early extraction of the six-year molars. C. E. F.

ZINGHER, ABRAHAM: METHODS OF USING DIPHTHERIA TOXIN IN THE SCHICK TEST AND OF CONTROLLING THE REACTION. (American Journal of Diseases of Children, April, 1916, p. 269.)

Zingher, in a well written and interesting article, concludes: (1) The great practical value connected with the Schick test makes it desirable that the results obtained with it should be reliable. (2) The accuracy of the results will depend not only on the toxin, but also on the care with which the test is made, and on the interpretation of the reaction. (3) The undiluted toxin is available in bulk or in capillary tubes. It should be well ripened and always kept in a cold, dark place. (4) The positive reaction should be considered as indicating a lack of immunity, unless the pseudo-reaction can be eliminated by a control test. The negative reaction is a definite sign of immunity. (5) It is important to remember that, in using diphtheria toxin in the Schick test, we are dealing with an accurate quantitative reaction and handling carefully-measured amounts of an active agent that has a tendency to deteriorate, even in bulk, if it is not properly protected from light and exposure and kept in a very cold place. (6) The results with the tests obtained in 2,700 normal children show that from 17 to 32 per cent. between the ages of two and sixteen years give a positive reaction and are probably susceptible to diphtheria. H. R. M.

CATES, BENJAMIN B.: SPINA BIFIDA. (Boston Medical and Surgical Journal, March 23, 1916, p. 420.)

In this paper the author reports 9 additional cases of spina bifida which came to operation in addition to the 7 already reported. He summarizes the 16 cases. The ages of the 16 cases varied from twenty-one days to thirty-four years. He believes the age is not so important a factor as the physical condition. Most of these patients, because of their low vitality, are poor risks. The author emphasizes that at some period in their life the sac will rupture, either as the result of the thinning from the accumulation of the cerebrospinal fluid or from the result of ulceration from trauma with all the dangers of infection. The surgeon may conscientiously urge the lesser of the evils, namely, operation under the most favorable of circumstances, rather than rupture with the risk of infection and of meningitis. Of the 16 cases 10 survived beyond a post-operative period of three months. Of these, 1 died four months later and 1 eight months later of pneumonia; 1 died six months later of hydrocephalus; 7 are living. C. E. F.

JACKSON, CHEVALIER: REMOVAL OF FOREIGN BODIES FROM THE UPPER LOBE BRONCHUS. (Annals of Otology, Rhinology and Laryngology, December, 1915, p. 759.)

The bronchoscopic removal of foreign bodies from the bronchi, bloodlessly through the mouth, is so successful—over 96 per cent. successes—that the causes of failure deserve careful study. Fortunately the upper lobe bronchi are rarely invaded by foreign bodies, but when they are, the sharp angle that any instrument introduced has to make to grasp the body and the necessity of seeing the end of the instrument at the same time renders the procedure very difficult. Specially constructed forceps have been used for this class of cases, a few of which are reported:

CASE 1. Girl of twelve years, with a glass-headed pin in left upper bronchus. The point of the pin was caused to project into left main bronchus by displacement of the spur with the lip of the bronchoscope and then grasped and removed.

CASE 2. Girl of eighteen years, with a bone in right upper lobe bronchus. This was removed with a side-curve forceps.

CASE 3. Girl of six years, with a peanut kernel in left upper lobe bronchus. Removed with straight forceps.

These short accounts of the removal of foreign bodies give little idea of the skill required to perform such delicate manipulations and only long experience and great skill may bring about these happy results. S. W. T.

BOORSTEN, S. W.: A SYMMETRICAL CONGENITAL MALFORMATION OF THE EXTREMITIES. (Annals of Surgery, February, 1916, p. 192.)

Patients with congenital abnormalities are no longer interesting exhibits, but interesting studies. Many of these are explained by the heredity theory of Mendel or by the pressure of amniotic bands on the ossification centers as Jensen describes. Of the congenital abnormalities of the extremities, polydactylism is frequently reported, while shortening of the metacarpals and metatarsals is not often recorded.

The author reports 2 cases with short metacarpals and metatarsals. In the first case the fourth toes of both feet were shorter than normal. The hands showed shortening of both ring fingers. Keibel and Mall give as reasons for faulty development: (1) Lack of active proliferation of the cartilage; (2) inactivity of the process of ossification; (3) premature union of the epiphysis with the main part of the bone; (4) growth of connective tissue between the growing cartilage of a bone and the region where ossification usually extends into the cartilage; (5) inflammation of the bone.

The second case showed a shortening of the fifth metacarpals. The author concludes: (1) Symmetrical defects of the metacarpals and metatarsals are occasionally found; (2) bilateral congenital malformation can be traced to heredity, while unilateral ones may be explained on principles of embryonic pressure defects; (3) cases of hypoplasia and agenesis should be reported, and still-births in families having some defects in the bones should be examined by an embryologist, to find if the embryological structures are normal. C. E. F.

BUFORD, COLEMAN G.: VARIED TOPICS CONCERNING THE SURGERY OF INFANTS AND SMALL CHILDREN. (Journal of Surgery, Gynecology and Obstetrics, May, 1916.)

The author believes that both minor and major surgical work in early infancy should be deferred if this can be safely done. The high mortality in infancy is due: (1) To the unpreparedness to do infant surgery. (2) To hemorrhage, which babies do not well withstand. In the newborn, 5 per cent. of the bodily weight is blood as compared to 8 per cent. in the adult. Hypodermoclysis and salt infusion are of no great use. Direct infusion into the external jugular, or by Bernheim's syringe method, or into the longitudinal sinus, as Helmholze suggests, are the best methods for combating hemorrhage. (3) Shock is not so important a factor in infant surgery as supposed. It is often the result of the hemorrhage. (4) Inanition is often uncontrollable. (5) Unexpected contagion is a frequent complication. (6) Wound infection is very prone to follow operations in infants. (7) Ether occasionally produces some unexplained protoplasmal damage to certain children. Nitrous oxide gas is dangerous for routine work. (8) High mortality is further increased by the serious nature of the condition requiring major surgery in early life. (9) Erysipelas develops far more frequently in infants after operation than in adults. It does not seem to be especially fatal. All wound dressings should be small and when possible should be sealed to avoid soiling.

In circumcision the most satisfactory results are obtained when the wound is left entirely exposed, but not allowed to come in contact with the clothing nor with the bedding. Dilute hydrogen peroxide dressings are valuable.

Operations upon the more deformed types of hypospadias and epispadias should be deferred until the organ is larger.

In frequency of occurrence inguinal hernia is second to circumcision. About 90 per cent. of the author's cases before the age of four upon which the truss treatment was used, recovered in less than two years. This treatment is usually effective after three to six months. The author believes the following indications warrant operation: (1) Strangulation and incarceration; (2) hernia not retained by a properly fitting truss; (3) refusal to allow truss treatment; (4) failure to cure after the child has worn truss two to four years. Operations are better deferred until child has reached an intelligent age.

In the treatment of umbilical hernia the author uses wooden moulds, about ¾ by 1¼ inches in diameter, retained by wide strips of zinc oxide adhesive. The most frequent abdominal sections are for congenital stenosis, acute and chronic intussusception and appendicitis. In gastroenterostomy for stenosis, most of the children die from continued inanition. The author recommends the Stone-Ladd operation.

After three years of age appendicitis is fairly frequent. Prolapse of the rectum, branchial cysts and cervical lymph adenitis, and enlarged thymus are commented upon by the author. He believes that goiter in child life is the result of a chronic toxemia. Every child examined with this condition has shown hypertrophied tonsils, which usually contain pus or cheesy material.

Fractures of the elbow are the most common of the arm fractures. It is advisable to put them up extended or at that angle giving the best approximation.

The author believes that the aid of the pediatrist is of great service to the surgeon in the post-operative care of children.

C. E. F.

Morgan, E. A.: The Post-Operative Management of Pyloric Stenosis. (American Journal of the Diseases of Children, April, 1916, p. 245.)

In the preparation of the patient the maintenance of the body temperature is important, as the sudden loss of body heat, in the author's experience, has been the undoubted cause of collapse occurring a few hours later. The limbs should be encased in nonabsorbent cotton and a hot-water bag should be slipped under the operating pad. Stimulants and hypodermoclysis should be avoided wherever possible before the operation. After the operation the body temperature should be carefully maintained and for the first few hours the head of the bed should be lowered. After nourishment is commenced the infant should be kept in a semi-erect position.

As a routine practice at the Babies' Hospital a hypodermoclysis of about 120 c.c. to 240 c.c. of normal saline or of glucose solution is given. Epinephrin subcutaneously is the most satisfactory stimulant because of the rapidity of its action. The author believes the value of a transfusion as a stimulant to be very questionable. In nearly all cases a post-operative rise of temperature occurs, due to reaction from shock, administration of stimulation and the administration of artificial heat. It returns to normal in thirty-six hours.

The most important feature of the post-operative care of infants is the feeding. One hour after operation the patient is given 16 c.c. of water and an hour later 12 c.c. of breast milk mixed with 4 c.c. of water. Breast milk is repeated every three hours, eight times daily, and is alternated with water. In twenty-four hours after the operation 16 to 24 c.c. of undiluted milk every three hours and a similar amount of water between feedings is given. At the end of the first week the baby should be put to the breast. In poorly-nourished infants an oil rub can be substituted for the daily bath until the danger of the occurrence of a subnormal temperature is passed. C. E. F.

MONTOBBIO, J.: OSTEOMYELITIS OF FEMUR FOLLOWING TYPHOID. (La Medicin. de los Ninos, August, 1915.)

A boy of twelve had a typical attack of typhoid. After three months, when nearly well, he experienced chills, vomiting, temperature of 40°C., and severe pain in the left thigh. Gradually an abscess formed, which was opened and drained. Three weeks later the same symptoms reappeared. Once more opened up, the wound disclosed quite an extensive necrosis of the femur. A large quantity of pus containing typhoid bacilli was evacuated. Recovery was slow but satisfactory. C. D. M.

GIFFIN, H. Z.: SPLENECTOMY FOR SPLENIC ANEMIA IN CHILDHOOD AND FOR THE SPLENIC ANEMIA OF INFANCY. (Annals of Surgery, 1915, p. 679.)

The adult form of splenic anemia as it occurs in childhood and the splenic anemia of infancy (Von Jaksch's disease) have many characteristics in common as well as certain distinctive differences.

The author divides the splenic anemias of childhood and infancy into two groups—(1) those conforming to the syndrome of the splenic anemia of adults, with absence of leukocytosis, and (2) those to the splenic anemia of infancy and showing a leukocytosis, the presence of a variable number of marrow cells and a relatively high color index. Jaucher's disease, lymphosarcoma, septic splenomegaly and the splenomegaly of syphilis, rickets and hemolytic jaundice are to be specially excluded in differential diagnosis.

The author has collected 5 cases from the literature which conform to the adult type of splenic anemia occurring in children under ten years of age. These were by Bland-Sutton, Luce, Sutherland and Burghard, D'Espini and Barling. Two of these cases died after a short interval. In 68 splenectomies in the Mayo clinic there has been only 1 in a patient of the first decade. Four cases of splenectomy for splenic anemia of infancy are collected by the author. They were cases of Wolff, Graff, Fowler and Pool. All of these were benefited by the operation.

The author emphasizes the following points: (1) The adult form of splenic anemia in childhood and the splenic anemia of infancy have a close relationship; (2) normal lymphocytosis and hemopoiesis are apt to occur in infancy; (3) splenectomy has been performed in only a few instances of the adult form occurring in infancy; (4) splenectomy has been performed in four instances of severe types of the splenic anemia of infancy with marked immediate improvement. C. E. F.

FUSCO, VINCENZO: DYSPEPTIC VOMITING TREATED WITH SWEETENED CONDENSED MILK: (Gazz. Osped. e Clin., November 22, 1914.)

Vomiting in infancy is a sign of either overfeeding or injudicious diet. At first the effect is that of a safety valve, but, continuing, may cause serious disorders. In general, if vomiting occurs, say half an hour after feeding, it may be a normal occurrence, but violently projectile vomitus right after food is to be considered as pathologic. Soon after the stools become green and badly digested, causing symptoms of malnutrition. Vomiting may be caused by imperfect formation of intestinal epithelium, or following various diseases, or by defective action of the gastric mucosa. Concetti thinks that digestive disturbances are frequent if sugar be deficient in food. Working on these lines a large number of cases were treated, adding a 10 per cent. solution of saccharose to the milk, and the results were excellent. Sweetened condensed milk was also employed. C. D. M.

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ORIGINAL COMMUNICATIONS

THE PROGNOSIS AND TREATMENT OF BANTI'S DISEASE IN CHILDREN

BY EDWIN E. GRAHAM, M.D.
Philadelphia

Splenic anemia is essentially a chronic disease, the first stage of which usually lasts for about five years, during which time the symptoms are mild; after this period, for two or three years, they steadily become worse, until, finally, the syndrome of Banti's disease—that is, hepatic cirrhosis, ascites and jaundice—develops, and the case rapidly progresses to a fatal termination. Cases have been reported which persisted for from ten to twenty years, but the juvenile type of this disease tends to run a more acute course than the adult form.

If not treated, or treated only medicinally, splenic anemia is almost invariably fatal. No permanent cure by medicine alone has ever been reported, although in some cases there has been slight temporary improvement. Hull reports a case of splenic anemia in which the blood picture was as follows:

Hemoglobin	44 per cent.
Red blood cells	3,880,000
White “ “	4,600
Polynuclears	66 per cent.

This patient refused surgical treatment, and was given ascending doses of Fowler's solution and Blaud's pills, 5 grains, three times a day. Under this treatment the blood picture improved somewhat, changing to the following:

Hemoglobin	55 per cent.
Red blood cells	3,950,000
White “ “	4,600

He was under observation for several months in the outpatient department of Jefferson Hospital. He steadily lost weight and ran an irregular temperature, but no signs of Banti's disease were present during this time.

Warren reports a case of Banti's disease in which, on being admitted to the hospital in a serious condition, operation was declined. Gastric hemorrhages and vomiting of blood took place continuously until death occurred from exsanguination.

Under surgical treatment the prognosis in splenic anemia is rather more favorable than otherwise, the outlook depending upon the duration of the disease at the time the spleen is removed. If done early, splenectomy is attended by slight mortality, and in uncomplicated cases a cure may be expected; but when the disease is complicated by other affections of chronic infectious nature, the value of the operation is questionable.

In children suffering from splenic anemia, splenectomy is even more advantageous than in adults, and complete recovery is the rule, with the rapid disappearance of all symptoms. After removal of the spleen the blood picture in most cases more or less approaches normal; but in a few cases it may vary greatly, so that five years may elapse before the differential count becomes normal.

When Banti's syndrome becomes well established the prognosis is most unfavorable, even though splenectomy be performed, for the vital organs have become the seat of degenerative changes and the liver is cirrhotic. In some cases of Banti's disease removal of the spleen will arrest the development, but it will not cause retrogression of the hepatic cirrhosis.

Recovery from Banti's disease has been reported in a few instances in which the spleen was removed, while the cirrhosis was very slight; but these are exceptional. As a rule, the mortality is very high when splenectomy is done at this stage, and the results are unsatisfactory, although isolated cases have been recorded of fairly well-established Banti's disease in which marked improvement followed splenectomy. In a series of 18 cases of splenectomy performed at the Mayo Clinic for splenic anemia of varying intensity, the following results were obtained:

Two operative deaths.
One death three years after operation from hepatic cirrhosis.
One death from foreign cause two and one-half years after operation.
Twelve in excellent health for from six months to seven years after operation.

Five of these patients presented Banti's syndrome. One of them died under the operation, and four in whom there was evidence of hepatic cirrhosis were in excellent health for varying periods up to seven years after operation. In all of these cases the hemoglobin was below 75 per cent., and the average white blood cell count was 4,200.

Armstrong reports a series of 32 cases of splenectomy for splenic anemia, with 23 recoveries and 9 deaths. Grutzner reports a case of Banti's disease in a girl, ten years of age, who was operated upon early, with the result that on the fifth day after operation the number of red blood cells had doubled and soon reached normal.

Caro's patient, a man, had a blood picture as follows:

Hemoglobin	35 per cent.
Red blood cells	1,400,000
Leukocytes	2,600

One year after the operation he had gained in weight, and was feeling well in every respect, his blood-count being the following:

Hemoglobin	80 per cent.
Red blood cells	4,000,000
White " "	14,800

Zancan reports a case of Banti's disease cured by splenectomy, and Sturgis records an instance in which the patient made a good recovery, and was in excellent health fourteen months after splenectomy for Banti's disease. Sutherland and Burghard report a case of splenic anemia in a girl, twelve years of age, who before operation had a blood picture as follows:

Hemoglobin	56 per cent.
Red blood cells	2,420,000
White " "	9,800

Three days after operation it had changed to: hemoglobin, 76 per cent., and red blood cells, 4,700,000.

In another girl, six years of age, the blood picture before operation was as follows:

Hemoglobin	30 per cent.
Red blood cells	1,870,000
White " "	2,400
Megalocytes and microcytes	

After operation it had become:

Hemoglobin	52 per cent.
Red blood cells	4,000,000
White " "	10,800

In both of these cases there was relief of all symptoms following the operation, and recovery was rapid.

In 1 case reported by Sutherland the patient was perfectly well four and one-half years after the operation, and showed no sign of splenic anemia. In not a few cases of splenic anemia which continued under observation, there was no sign of recurrence for five years after operation.

The mortality in splenectomy for Banti's disease cannot, however, be based upon the results in these isolated cases which have been reported, since it is most likely that many fatal cases in this group were not included. Until the year 1908 the mortality following splenectomy for splenic anemia was 17 per cent.; from 1908 to 1912, 47 splenectomies were performed, with 5 deaths, this mortality being a little above 10 per cent. But these figures are based on cases in which the symptom-complex of Banti's disease—*i.e.*, jaundice, ascites and hepatic cirrhosis—was not present.

Roehling collected a series of 70 cases, with a mortality of 8 per cent. But these must certainly have been cases of splenic anemia in the early stages, since in Banti's disease the mortality varies from 50 to 70 per cent. Banti estimates it at 50 per cent., and Rodman and Willard at 56 per cent.

Until the year 1908 the mortality in splenectomy for Banti's disease was 72 per cent.; from 1910 until 1914 there were 16 cases recorded with 9 deaths, a mortality of 56¼ per cent. These figures would appear to be correct if the cases of Banti's disease are carefully selected so that splenic anemia is not included in the series. When the pathological lesions of true Banti's disease are taken into consideration, any mortality rate lower than this is probably to be attributed to errors in diagnosis or to a failure to classify splenic anemias accurately.

Medical Treatment—Iron in the form of Blaud's pills, 1 to 5 grains, three times a day, and Fowler's solution, may be given for the anemia; but they in no way influence the underlying cause of splenic anemia, hence no permanent cure can be effected by this therapy. Salvarsan may bring about temporary improvement, and X-ray treatment sometimes gives relief for a short time; but these measures are likewise of no avail in curing the disease.

Surgical Treatment—Splenectomy was introduced by Eppinger, who believed that in all cases of hemolytic anemia a pathologic and increased destruction of red blood cells took place in the spleen. In splenic anemia there is evidently an infectious or toxic process going on in the spleen, which causes fibrotic enlargement and the formation of a splenic hemolysin. Therefore, in these cases, removal of the spleen has ample justification, even though it is still a mooted question whether the favorable results of splenectomy are due to regeneration of corpuscles or to decreased hemolysis.

If an abundance of iron is supplied to the system after removal of the spleen—which is the organ in which iron metabolism takes place—polycythemia will result in many cases, and an increase in red cells is always noted at varying intervals after operation; therefore, in splenic anemia iron is undoubtedly indicated, both theoretically and practically. It is also believed that the cirrhotic changes which in Banti's disease take place in the liver are due to toxins produced by the spleen; this explains the favorable influence of splenectomy on the liver. Splenectomy is, however, both useless and dangerous in cases where the hemoglobin is below 30 per cent., and the red blood cells are below 2,000,000. The operation should, as a rule, be attempted only when there is no edema, no parenchymatous nephritis, no serious degenerative change in the liver, and while the patient is still able to go about.

In severe cases blood transfusion, if done shortly before the splenectomy, seems to increase the ability of the child to withstand the shock of the operation.

The operation of choice in Banti's disease is splenectomy by Talma's operation. Among the various other operations suggested are the sewing of the spleen to the anterior abdominal wall and the cauterization of the spleen.

In 25 per cent. of the cases of splenectomy for Banti's disease, there is afterward pain in the long bones, this being probably due to hyperplasia of the red bone-marrow. After splenectomy for either splenic anemia or Banti's disease there is always danger of gastrointestinal hemorrhages or of secondary infection owing to lowered power of resistance. Hemorrhages from the stomach and intestines are most likely to occur during the first two weeks after operation, and must be treated by complete rest for the upper abdomen, by injections of saline or of blood serum, or by direct transfusion.

CASE I. Marie I., white, seven years old, admitted to Jefferson Hospital August 11, 1915, for swelling in the abdomen and attacks of nose bleed.

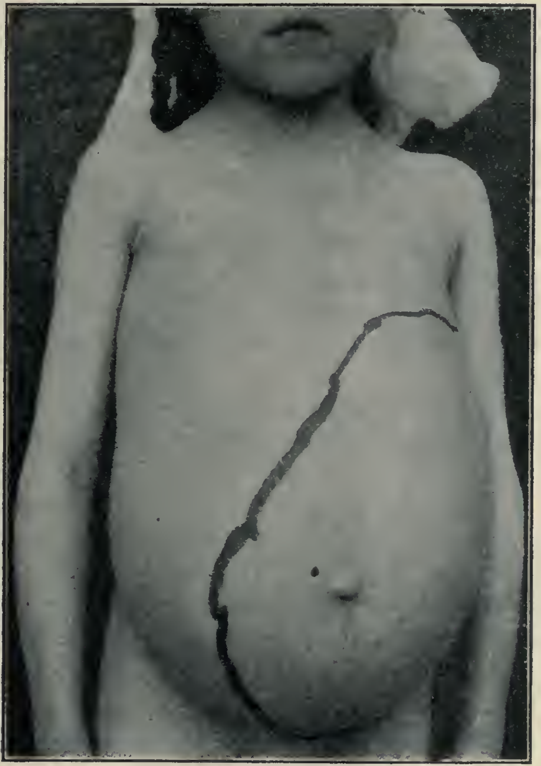
The family history was absolutely negative. Both father and mother living and well; father had nose bleed when a young man. Marie is the ninth child; five brothers and three sisters are all well, and none of them has a large abdomen.

Personal History—Child was born at full term, and birth was natural. Breast-fed for first fifteen months, then bottle-fed until two years old, and since has eaten ordinary food, like other children.

Had pertussis when less than four years of age, chickenpox at five, German measles at six. Never had diphtheria, sore throat, scarlet fever, nor pain in the joints. Had an attack of jaundice when three or four days old, which lasted a few weeks, then cleared up, and has never returned. Mother says the child's abdomen has been large ever since she was two years old. Appetite has always been fair, but peculiar. Bowels at first were regular, with occasional diarrhea.

Five years ago she had a first attack of nose bleed, which lasted a long time. Nose bled every day for two weeks, and she lost a great deal of blood.

Present Illness—Mother dates the child's illness back to the nose bleed five years ago. Nose bleed has persisted off and on until the present time, the last bleeding having taken place January 24, 1915. Hemorrhages are always worse in the summer, and have rarely occurred in cold weather until the past winter, when she had three very severe ones.



Marle I., aged seven years. Note enlarged abdomen and tracing showing enlarged spleen of splenic anemia

In the spring of 1913 she had measles, and made so slow a recovery that her physician investigated, and then discovered the enlarged spleen. The child had become very anemic, owing to nose bleeds, several of which necessitated packing of the posterior nares, and the blood then dripped through the packing. In the spring of 1914 she had German measles, which again impoverished her so that she convalesced very slowly. On several occasions, in 1913, her mother noticed several hemorrhagic spots under the skin of the anterior chest which looked like bruises. She never had bleedings from the gums or the vagina. The mother saw these subcutaneous hemorrhages in the spring of 1914, and never since. The spleen has remained about the same size.

Last year the mother took the child to Dr. P. B. Bland, who said she had splenic anemia, and rather favored operation. Dr. Beardsley made the same diagnosis.

The bowels have always been very loose, and recently of a light yellow color, but have never been really white. Last March she had several loose bowel movements, which the mother says were mixed with a great deal of dark, clotted blood, also that at this time she vomited a great deal of black material which looked like coffee grounds; she had never done so before, nor has she since.

The mother says the child's general condition is better, but admits that the little girl gets more easily tired than usual. She has had several attacks of palpitation. Her ankles have never been swollen, nor has she ever been very short of breath. The appetite is fair. The mother says she has been growing faster than usual in the last few months. She has never complained of headache, nor had any eye trouble; has never had a cough or expectoration, and has not lost much weight. The mother says that several times lately she has complained of being very tired after extremely slight exertion.

Physical Examination—An anemic-looking, undernourished child. Protuberances in abdomen show plainly.

Eyes—Pupils equal and active. Conjunctivæ pale. Suggestion of icteroid tint to scleræ.

Mouth—Teeth fair. Mucous membrane generally pale. Tongue clean; no tremor.

Neck—No palpable glands. Thyroid not felt. Pulsation of vessels at root of neck, also of jugulars.

Thorax—Expansion fair. No apparent dyspnea. Prominence of superficial veins. Lungs clear and resonant throughout, except at lower left axilla, where there is dullness and absence of breath sounds. Diffuse visible cardiac impulse in third and fourth left interspaces, most palpable in third interspace in nipple line. On auscultation thrill is felt. Heart sounds rapid. A presystolic murmur at mitral area with sharp second sound. Pulmonic second sound is accentuated. Heart shows displacement upward.

Abdomen—Marked protuberances, mainly on left side. Splenic outline visible on right. Marked prominence of abdominal superficial veins. Splenic dullness begins in fifth interspace in midaxillary line. Left border seems to be on a line with posterior axillary line, beginning about two finger-breadths above xyphoid, and curving out to right until, at level of umbilicus, it is approximately 3 inches from that spot; the spleen fills almost the entire abdomen. Transverse diameter of the spleen at umbilicus is, roughly, 11½ inches; vertical diameter is practically 9 inches. Dullness at Poupart's ligament on either side. Spleen is firm, notch easily felt; not tender; freely movable. Liver dullness apparently not increased. No evidence of any fluid in peritoneal cavity.

Externally, numerous purpuric spots on lower limbs, especially on outer surface of right thigh and outer aspect of left lower leg.

LABORATORY REPORTS

On August 12, 1915, the urine was clear, light amber, specific gravity not taken, very slight trace of albumin, no sugar, no crystals, a few urates; urea, 1.9 per cent.; no red blood corpuscles; a few hyalin casts; 3 to 5 pus cells.

COMPLETE BLOOD COUNTS

August 12, 1915	*August 16, 1915*	*August 19, 1915*
Hemoglobin, 52%	Hemoglobin, 45%	Hemoglobin, 43%
R. B. C., 3,300,000	R. B. C., 3,320,000	R. B. C., 3,370,000
W. B. C., 6,200	W. B. C., 2,400	W. B. C., 4,400
Color index, .8	Color Index, .6	Color Index, .7
Polynuclears, 58%	Polynuclears, 55%	Polynuclears, 57%
Lymphocytes, 41%	Lymphocytes, 44%	Lymphocytes, 43%
Eosinophiles, 1%	Eosinophiles, 1%	Eosinophiles, 1%
R. B. C. show change in size and shape	R. B. C., pale center. Slight poikilocytosis. Staining seems to be normal	R. B. C., pale center. Slight poikilocytosis. Few macrocytes

Minimal resistance, .42 per cent. Maximal resistance, .26 per cent.

This is the resistance to varying strengths of hypotonic salt solution of red blood cells.

The red blood cells begin to hemolyze in a .42 per cent. salt solution, hence the minimal resistance is .42 per cent. The red blood cells are completely hemolyzed in a .26 per cent. salt solution, thus maximal resistance is .26 per cent. Normal minimal resistance is .47 per cent., and normal maximal resistance is .3 per cent.

On August 14, 1915, Wassermann of blood was negative. Hemoglobin, markedly reduced. Red blood cells usually not below 3,000,000. Slight poikilocytosis and the presence of normoblasts. An actual leukopenia, but a lymphocytosis.

On April 28, 1916, the mother wrote concerning the child as follows::

"Marie keeps about as usual. Has had several of those cutaneous exhibitions of internal hemorrhage, but all slight. Mumps were prevalent in her school last winter; she took cold, and had nose bleed several times, swelling of the glands, high temperature, and was ill for a few days, but this is the extent of apparent symptoms. Once in a while I think she is nervous, but otherwise keeps as well as the other little ones. Goes to school pretty regularly, gets 100 in her studies, and enjoys every minute of her work. Eats fairly well, and sleeps well. Is very industrious. I fear for her when warm weather comes, as it is at this time of year that she always bleeds profusely from the nose."

Examination on April 29, 1916, as follows:

Weighed on August 21, 1915, 45¼ pounds.

In September, 1915, had diarrhea for three weeks. Bleeding from nose occasionally, never profuse, except once in December, 1915, when she was home from school for two weeks. Purpura occasionally on back, legs and arms, but never on face. Bowels are always inclined to be loose.

In February, 1916, she had swelling of the glands of her neck (mumps?), associated with fever and nose bleed.

Present weight, 48 pounds, 10 ounces. Six months ago weighed 46 pounds. One year ago weighed 50 pounds.

Occasionally blood-streaked saliva dribbles from her mouth at night, and this past winter she has noticed a slight oozing of blood from the posterior gums.

The blood and urine reports of May 1, 1916, are as follows:

Blood—

Hemoglobin	70 per cent.
Erythrocytes	4,460,000
Leukocytes	3,500
Color index	.8
Polymorphonuclears	61 per cent.
Small lymphocytes	31 " "
Large lymphocytes	7 " "
Eosinophiles	1 " "

Red blood cells stain palely, and show slight poikilocytosis. No nucleation.

Urine—

Quantity submitted	100 c.c.
Transparency	Turbid
Sediment	None
Color	Yellow
Odor	Urinous
Specific gravity	1.016
Reaction	Acid
Albumin	None
Sugar	None
Acetone	None
Diacetic acid	None
Urea	1.3 per cent.
Crystals	None
Amorphous	Few urates
Cells:	
Epithelial	Few
Leukocytes	Few
Erythrocytes	None
Renal tube casts	None

SPEECH SIGN OF CONGENITAL SYPHILIS—W. B. Swift (Boston Medical and Surgical Journal, 1915, Vol. CLXXIII., p. 619) says that congenital syphilis can cause a faulty or incomplete development of vocal cords that results in vocal monotony and harshness in both conversation and weeping. As spirochetosis has been of late offered to cover all the lesions of syphilis, he proposes as a name for this sign scaphoid vocal cords and spirochetotic harshness.—*American Journal of Obstetrics.*

LITTLE'S DISEASE (CONGENITAL RIGIDITY OF INFANCY)*

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In presenting this subject for consideration, I have in mind an attempt to bring to your attention a summary of some of our knowledge relating to an interesting symptom-complex. Perhaps it might better be called such, rather than bear the patronymic term of Little's disease,[1] although the latter designation can with propriety be continued in use if we would delimit the cases originally emphasized by the bearer of the title. From a perusal of the literature this would eminently be proper both to give recognition to one who insistently labored to bring about an understanding of the disease in question, and especially the factors he considered prominent in its production, and, furthermore, to exclude from the category certain allied afflictions of children which have no place therein.

From another viewpoint, that of the prevention of infant morbidity and mortality, it has seemed fitting to present this title before the Society, for while the causes operative in the production of Little's disease are largely, if not entirely, prenatal and therefore obstetrical, the aftermath of these is not seen by the obstetrician, but by the general practitioner, the pediatrist, or the orthopedist.

It is interesting to note that William John Little, an orthopedic surgeon, presented his well-formulated views upon the disease bearing his name before the Royal Obstetrical Society of London[2]—of which he was not even a member—but did so evidently with the realization that the etiology of congenital spastic paralysis was a matter of moment to the student of midwifery, just as much so as the treatment of such condition most frequently claimed his personal attention.

It would seem best to confine the term "Little's disease" to those cases of infantile spastic paralysis clearly dating from the time of birth, for such was the conception of Little himself, rather than to include various similar affections originating during infancy which later show spasticity and plegia, but there exists, especially among American writers, a tendency to ambiguity in their inclusive descriptions of these cases which is even more evident in text-book descriptions.

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* Read before the Clinico-Pathological Society of Washington, D. C.

Any insult to the cortex of the brain or subcortical structures occurring in infancy, or even in adult life, leaves its tell-tale relic of spastic paralysis, but such terminations of nerve destruction, solely because they happen to be seen in infancy and childhood, should not be classed as cases of Little's disease.

Reference to text-book authorities shows these various conceptions of the malady: Holt,[3] in his well-drawn description, agrees closely with that of Little. Peterson[4] describes the disease under the generic head of infantile cerebral palsies. McCarthy[5] describes the condition under the heading "Hereditary Spastic Paralysis," and continues erroneously to say: "In the first group of cases there is no evidence of cerebral disease. There is simply an affection of the spinal motor roots. These may occur as isolated cases (Little's disease)."

According to some, Little's disease presents no evidence of mental defects; according to others, this name should be applied to paraplegic cases only, and, strange to relate, E. Muirhead Little, the son of the early English writer, concurs in this latter conception, which seems untenable after a perusal of his father's original reported cases.

E. Muirhead Little,[6] the son, states: "Although he (W. J. Little) did not especially mark out the diplegia group, the term Little's disease is now generally limited to those cases in which both lower limbs are affected, but not the upper, and which are generally of congenital origin."

Contrast with this the very early writing of the elder Little:[1] "You may meet with rare cases in which the whole of the muscles of the extremities, flexors and extensors, adductors and abductors, appear conjointly spastically affected, the *entire* muscular system being permanently affected with tetanic stiffness, flexion preponderating in the extremities, probably through the powers of the flexors and adductors exceeding that of their antagonists. . . . A common accompaniment of contraction in a large proportion of the voluntary muscular system, as of *two* or *more* extremities, and particularly at the same time when the muscles of the face and chest are involved, is an impairment of the intellectual powers."

"In many of the cases of unsual contracture of the *upper* and *lower* extremities which have fallen under my observation, the subjects were born at the seventh month or previous to the eighth month of uterogestation."

So far as I can discover from a perusal of the entire list of over 60 cases later reported by the elder Little,[2] there is made no limitation in his descriptions to those cases involving the lower limbs only. As a matter of fact, this early writer contributed the earnest results of his clinical studies for the information of the profession at a time when the refinements of pathologic technique were unknown and, necessarily, he included among his cases several instances of conditions which we now know were of peripheral and not central origin, *e.g.*, 2 cases of wry-neck.

That confusion has existed even down to recent times is strikingly evidenced in a paper read in St. John's Parish Hall in this city, in 1897, by Sachs, of New York, entitled "Little's Disease: Shall We Retain the Name?" As to the question, "What is Little's disease," Sachs says: "The only just answer would be, whatever an author pleases to call it!"[7]

Spiller[8] claims, with justice: "As in the progressive muscular atrophy of the Aran-Duchenne type, we now honor Duchenne by recognizing only one disease as representing this type, so it is hoped that Little's name may be preserved by excluding some of the different forms of congenital spastic rigidity now classed under the term Little's disease. At the same time it should be remembered that Little confused many types."

Having in mind the poetic license accorded by Sachs to every writer, as well as the confusional classifications of the earlier writers and the rather preponderating evidence brought forth by the French school, it would appear that Little's disease is clearly entitled in nomenclature to represent cases of congenital spastic rigidity or paralysis, having their origin before or during the act of birth, because of causes operating within the central nervous system and especially within the cerebrum, thus excluding the whole group of spastic plegias occurring during infancy, non-congenital, as well as those paralyses dependent upon peripheral lesions, such as the paralysis of Erb.

Etiology—The etiology of the disease is really the most interesting part of its study. The causative factors are both prenatal and natal, if we would eliminate from consideration the cases of spastic paralysis developing late in infancy, which, I believe, have no claim to inclusion under the title of this paper.

The prenatal causes have even been made to include familial ones, for various descriptions of several members of the same family having this affliction are found in the literature. (Brower,[9] Dercum,[10] Douillet,[11] Good.[12])

The occurrence of the disease in more than one of the offspring of the same mother has been suggested to have been due to the operation of a similar cause, either prenatal, or, during the act of birth, such as syphilis or contracted pelvis, the latter exerting undue cranial compression on successive births.

Prenatal Causes—Little himself ascribed to prematurity a predominating rôle in the production of the malady bearing his name. He states:[2] "The fact of the greater liability to the universal spasmodic contraction of infants prematurely born is susceptible of two explanations. I have ascertained that the premature labors in question were rarely induced by mechanical injury or sudden application of other causes, such as excessive exertion or a violent emotion, but were consequent on derangement of the health of the parent of some duration. An explanation, therefore, suggests itself that deteriorated health of the parent had decidedly impaired the nutrition of the fetus, and both directly and indirectly the healthy development of the nervous system of the fetus, creating a susceptibility to disease."

Over half of Little's original 60 cases were born before term, yet in recent times the percentage of prematures has seemed less large, for example, Sachs reports but 3 cases in a series of 42 cases he has tabulated.

The French writers ascribe to prematurity a distinct etiological place, but, in most instances, attribute its causation to the presence of syphilis either of the father or the mother, especially the former.

Premature birth, whether due to lues or to other causes, certainly seems to explain a basis upon which can be built up the later manifestations of nervous lesions, as has been persistently claimed by Van Gehuchten and others. The former[13, 14] claims that in the newborn child at full term the white fibers of the pyramidal tracts have not yet acquired their myelin sheaths, and, furthermore, that in children born at seven months, the pyramidal fibers do not yet contain axis cylinders, at least those passing below the medulla oblongata. Brissaud, quoted by Sachs,[7] accounts for the preponderance of the affection in the lower extremities by insisting that it is very likely that the region of the paracentral lobule, whence issue the pyramidal fibers destined for the lower extremities, has the poorest blood supply of all cortical areas.

Flechsig[15] has shown the limited plotting out of the cortical centers, even at the time of normal birth, and has traced the development of these, as well as the myelinization of the fibril groups, through the various ages of fetal growth. If the fetus be born prematurely an even greater proportion of its nervous structure is found incapable of function and resistant to further development (agenesis) than should the arrest occur at full term, but even in the latter event, as we shall see in considering the natal causes, checking and retardation of cellular and fibrillar growth in the nervous system leaves as indelible mark upon the nervomuscular apparatus of the individual.

Prematurity, therefore, presents an organism deficient in its mechanical makeup; this alone because of the deficiency in the descending motor fibers (Van Gehuchten) from already defective cortical areas, upper neuron agenesis it may be called, is sufficient to produce spastic paralysis from the removal of control from the higher centers of the lower neuron series in the various segments of the spinal cord.

Premature labors are quite often precipitate labors, associated with rapid passage of the fetus through the maternal channels without adequate time being permitted for the moulding and adaptation that is so characteristic of the normal delivery. Thus the factor of prematurity contributes in a predisposing form to the real birth traumas, the importance of which is readily seen.

One must question very strongly why prematurity *per se* should give rise to Little's disease when one sees so many infants born prematurely grow and develop into healthy beings. What is the nervous shock or stamp which stays the processes of nerve development on the one hand, and, on the other, fails to register any impress whatsoever upon the proper myelinization and functional development of the nervous system?

Among prenatal causes of spastic rigidity of questionable plausibility have been put forward intrauterine meningitis and encephalitis, congestion of the brain following the encircling of the fetal neck by coils of the umbilical cord, trauma to the mother during pregnancy, prenatal cerebral hemorrhage, and many others equally fanciful.

Next to prematurity, perhaps even intimately associated with it among prenatal factors, should be placed syphilis, which is the strong conviction of almost all of the French students of this malady.

According to Adeline,[16] in 13 cases of Little's disease examined by a Wassermann test by Pierre Delbet, thirteen positive reactions were obtained. To these results he adds three positive Wassermann tests obtained in cases of his own. Adeline presents, in addition, striking arguments from many clinical standpoints to uphold his contention that the disease in question is *par excellence* of syphilitic origin. In recording 7 cases, both parents were known to be syphilitic in 2, and in the remaining 5 the father had known syphilis. Adeline remarks that it is interesting to note that in his cases having a paternal syphilitic origin, the parents themselves were the victims of *nervous system* lesions, tabes, general paralysis, cerebral syphilis, etc., and points to the view of Gaucher on the affinity of certain kinds of syphilitic infections for the nervous system, a biotaxis frequently insisted upon by Hagner, of Washington.

The possible luetic origin of Little's disease was first mentioned by Fournier in his treatise on "Les Affections Parasyphilitique." Hutinel and Babonneix in 1911[17] likewise insisted upon this etiological cause. Space forbids the enumeration of the arguments of many others of the French school, but among those who have contributed to this basis are DeAmicis, Babonneix, Babonneix and Tixier, Pierre Delbet, Moncorvo, etc., etc.

Natal Causes—A premature birth usually occurs with but little trauma as compared with the chances of prolonged and violent compression of the fetal head at term delivery. There is a possibility, however, of the delicate organism of the premature being more susceptible to the traumatic impress of its passage through the parturient canal, and the thought must be kept in mind that the vascular system of the baby born before term is equally in a preformed state with that of its nervous structure and that leakage from the delicate vessels of the brain is more easily made possible than with the child at term.

Prolonged and difficult labor, together with instrumental delivery, stand in a paramount relation to the subsequent development of spastic paralyses. The influence of the factors named is, in most instances, in the production of hemorrhage into the nerve structures of the brain, sometimes gross and extensive, more often minute but widespread.

The majority of such birth hemorrhages occur in children of primiparæ, are more common at the base than over the cortex in head presentation (McNutt,[18] Holt[3]), and in breech cases occur with greater frequency over the upper surfaces of the cortex—another factor in the explanation of the frequency of these paralyses subsequent to premature birth which so often occurs by the breech. Basal hemorrhages in the infant, as in the adult, more frequently are fatal, while lesions on the cortical convexities permit of life and the consequent degenerations shown in Little's disease.

Furthermore, the leg centers lying within the upper reaches of the cortex would naturally be those most frequently damaged by such polar hemorrhages, which may explain the frequency of paraplegias in the malady under consideration. If the hemorrhage occurs from the smaller vessels and is rather widespread, then result the paraplegias, diplegias and quadriplegias—or tetraplegias, as they might be better named. If more localized, which usually means more in bulk of extravasated blood, the hemiplegias result.

Hemorrhage at birth, whether cortical or subcortical, if the damage resultant therefrom has been sufficiently great, means, in the subsequent growth of the infant, either agenesis of underlying tracts or actual degeneration of those already laid down. In either event there is lack of function in the subordinate structures or escape from control of the higher regulation, the effects of both being seen at a later period of growth—the former as paralysis, the latter as spasticity (independent lower neuron stimulation).

Asphyxia Neonatorum—It is impossible to differentiate asphyxia neonatorum as a more or less transient physiological state, perhaps a "twilight sleep" after the sunset of placental breathing and before the dawn of respiratory effort due to accumulated CO_2 in the fetal blood—from that prolonged suspended animation which is no doubt largely a symptom of brain injury and which frequently precedes the syndrome of Little.

I have personally heard Jacobi remark upon the seriousness of every moment of asphyxia following birth. Little has insisted upon its importance in the production of the disease bearing his name in the following words:[2] "The newborn child that has not yet attained to thorough independent existence tolerates a longer duration of suspended animation than the child in which pulmonary respiration has been thoroughly established or than the adult, yet reflection on the nature of a delay of only a few moments in the substitution of pulmonary for the ceased placental respiration would lead to the apprehension that even the want of a few breathings, if not fatal to the economy, may impart a lasting injury upon it."

Asphyxia has been noted in from one-third to one-half of many of the recorded cases (Sachs, Little), and, according to many writers, the asphyxia with resultant cerebral engorgement is the cause *per se* of the cerebral hemorrhages followed by the later paralyses. It seems most difficult, in my mind, to differentiate between asphyxia as a cause of hemorrhage and asphyxia as a result and concomitant symptom of hemorrhage which has preceded the state of suspended animation.

The influence of instrumental and manual delivery, such as that incident to the performance of version, in the production of subsequent spastic rigidity must be attributed to the brain hurt of hemorrhage and yet it would be unwise to attribute to these forces proportionately too great a rôle in the causation of birth trauma, if one does not at the same time consider the equally deleterious effects of prolonged and difficult delivery which may place the infant organism in even greater jeopardy. It seems probable that dystocia is the much greater evil.

Foerster[19] presents an interesting conception from a phylogenetic standpoint in explanation of the deformities of Little's disease. He has carefully studied characteristic attitudes and muscular excursions of the legs and arms of monkeys and apes, as well as some of the lowest orders of mankind. He has described what he believes to be the basic attitudes at rest, as well as characteristic muscular combinations of the limbs in motion, which are phylogenetically old in type. There is in the limited motion in the affected limbs in Little's disease reversion to such types. With the loss of cortical control and the subsequent return to spinal stimulation, even approximating the segmental of the low vertebrates, the older and basic cord innervation assumes a command which the cortex has wrested from it in the process of evolution.

This attempt of Foerster to bring Little's disease within the scope of phylogenetic classification is in keeping with the effort of modern neurologists to simplify what has heretofore been woefully disorganized, as shown by Jelliffe and White in a recent plea for a better classification of nervous system diseases built upon a phylogenetic basis.[20]

Of great interest from this standpoint, as well as from an etiological one, is the contemplation of a condition which obtains among some infants in certain South American countries in which the brain cortex becomes damaged at a very early age by the localization therein of the Trypanosoma cruzi. This malady, called Chagas' disease, because of the discovery of the offending parasite by Carlos Chagas, is an infection by the trypanosoma through the bite of an insect, the triatoma magista.

The disease appears to be extremely prevalent in the interior of Brazil. In a personal communication from Dr. Bailey K. Ashford, U. S. A., who made a survey in that country in March and April of this year, I am told that the disease seems upon the increase and that he observed many children crippled by the malady.

Chagas himself writes:[21] "In the chronic forms the most common type is cerebral diplegia caused by the localization of the parasites in the cortex of both hemispheres. The paralysis and contractures are most marked in the lower extremities, and as the disease usually dates from childhood, the patients resemble old cases of Little's disease. Athetosis and other abnormal movements are common. Severe degrees of idiocy are frequent. In other cases in which intelligence is preserved aphasia exists."

Here is a group disease which represents in reality the only postnatal development of Little's disease in all of its completeness which is worthy of recognition as such. The early cortical lesions due to the stuffing of the surface vessels with trypanosomes, with later descending degeneration of the pyramidal neurons, throw out of commission the identical nerve structures damaged through birth injury or lacking through agenesis, and thus the ultimate results of all are the lasting relics of paralysis—spastic in nature through the automaticity of the unbridled spinal neurons.

Pathology—Opportunity has been offered in numerous instances to observe the pathological changes to which the paralyses and spasticities are due. Taken collectively these show hemorrhage, meningeal, cortical or intracerebral, although the last is rare, defect, degeneration and inflammation.

In many of the prenatal cases there have been actual cerebral defects, porencephaly, failure of development of both cortical areas and descending pyramidal tracts. The more aged lesions have been those of atrophy, degeneration, sclerosis, meningoencephalitis, and cystic formation. Cysts occupying the substance of the cortex, or fluid lying within the arachnoid space filling up the deficiencies due to atrophied convolutions have been encountered.

The nerve agenesis and degeneration, while rather widespread, may often be traced to lesions in some specified part of the system, and these interruptions in continuity can with advantage be topographically located first, in the cortex, secondly, subcortical, and thirdly, spinal (Dejerine). Of these three classes primary destruction or non-development of the brain surface is largely responsible for the production of the syndrome of Little.

I will cite one or two instances of pathological reports, which may be taken to typify the changes in nerve structure dependent upon the kinds of interrupted continuity just mentioned.

In regard to the cortical cases, Van Gehuchten,[13] reasoning along the lines of the teachings of Flechsig, maintains a basis of agenesis to which he ascribes the halt in development of cellular structure and more especially of the fibrillar offsprings radiating therefrom. This teaching he particularly applies to infants showing premature birth, but holds it applicable to those born at term as well. Spiller[8] has produced concrete evidence that such lesions may be found. In a case carefully studied he found "actual arrest of pyramidal fibers—fineness of the nerve fibers forming the crossed pyramidal tracts." In another case he relates: "There was evidently an agenesia of the pyramidal tracts of the spinal cord without macroscopic lesions, as in my first case, and the cause was probably premature birth at the seventh month." (See also Dejerine,[22] Delbet.[23])

Welch, in a case studied for McNutt,[18] states that "on opening the calvarium more arachnoid fluid was found than normal. There was everywhere edema of the pia, but especially in the fissures of Rolando. At the junction of these fissures a large collection of fluid was found under the pia, and upon its evacuation atrophy of the cortex about the fissure of Rolando upon both sides was disclosed. (This is an interesting finding, in view of the theories of treatment advocated by Sharpe, which will be mentioned later.) In each cerebral hemisphere there is atrophy of the paracentral lobules, of the central convolutions and of the roots of the frontal convolutions. This atrophy is somewhat more marked in the right than in the left hemisphere. . . . In each hemisphere the situation of the central convolution is occupied by a sulcus, the margins of which are the adjacent frontal and parietal convolutions. In this sulcus can be seen the atrophied cortical convolutions. . . . Upon section it is evident that the atrophy involves that part of the central cortex adjacent to the floor and the sides of the precentral sulcus and the sulcus of Rolando. There also appears to be complete absence of the gray matter in the bottom and along the lower half of the sides of these sulci. . . . On miscroscopic examination the cortex is replaced by finely fibrillated tissue rich in nuclei, and in corpora amylacea. This rim of sclerotic tissue replacing the cortex measures one-half to one millimeter. In this tissue no ganglion cells or nerve fibers are to be seen and no trace of the different layers of the cortex to be made out. In the bottom of the Rolando and precentral sulcus the cortex has entirely disappeared and is replaced by sclerotic tissue; in ascending along the sides of these sulci the cortex begins to appear first as the molecular layer, then the layer of small pyramids, and at the top of the convolutions all of the layers can be made out. There is typical bilateral degeneration of the pyramidal tracts. Diagnosis, 'sclerosis of the greater part of the motor cortical area in both hemispheres, with secondary descending degeneration of the pyramidal tracts.' "

As typical of the possibility of *subcortical* lesions causing cleavage of the higher from the lower centers, Archambault[24] found in a case of Little's disease coming to necrospy, "Brain convolutions sharp and well defined. In the motor area on both sides, small and distinctly atrophied. Cerebrum everywhere firmer than normal, and especially in the motor areas on both sides. Section shows decrease in gray matter in convolutions of the motor areas with increase of white matter. . . . Study of sections taken from any level of the peduncle, it is seen that the pes pedunculi, and more especially one red nucleus, are distinctly atrophied, their volume being strikingly inferior to that of their homologous structures. The atrophy of one of the nuclei rubri constitutes the feature of predominating interest, the affected nucleus being less than half the size of its fellow, devoid of its usually well-developed capsule (formed by the convergence of great numbers of fibers) except along its mesial surface aspect, and otherwise encircled by a remarkably degenerated annular zone. Vascular lesions are distinctly seen in this region of the stem. In a résumé of this case Archambault asserts: "There was appreciable degeneration of both pyramidal tracts throughout their course, as well as of both mesial fillets. A marked atrophy of one red nucleus. The degeneration of the motor tracts, evidently the result of cerebral sclerosis, was well marked in this case, though the area degenerated in both lateral columns *far exceeds* the proportion accorded by classic writers to the territory of the crossed pyramidal tracts, and we are of the opinion that other degenerated tracts contributed to the topography of this sclerosis. The lesions described between the red nuclei involve the rubrospinal tracts described by Monakow." Dejerine[22, 25] pointed out in 1897 that a *spinal* lesion might cause the syndrome of Little and reports a case in which there were no lesions of the cortex or central gray matter, though the cord was smaller than normal. He found between the first and second cervical segments a circumscribed lesion. "The posterior horns at this level were destroyed and replaced by sclerotic tissue. Ascending degeneration was not observed in the posterior colums, but the pyramidal tracts presented retrograde in descending degenerations." Dejerine states that his second case demonstrates that the symptoms of Little's disease may be due to a primary, focal, spinal lesion which has developed during the intrauterine period, and is possibly the result of an infectious process.

Spiller[8] has reported a peculiar spinal lesion in which the bodies of the third and fourth cervical vertebrae, as the result of birth injury, extended backward into the spinal canal and compressed the spinal cord partially. There was resulting degeneration of the posterior lateral and right pyramidal tract, slight degeneration of the left pyramid.

Symptomatology—I will not attempt to describe with too great detail the symptoms manifested in Little's syndrome, as the clinical picture of the disease at different ages may be drawn from the citation of a few appended cases illustrative of the status of disability at various ages from that of infancy to the age of nine years.

The train of symptoms noted in the malady may be attributed to two initial and later progressive disabilities of the central nervous system. The first of these is an underdeveloped or damaged cortex, which implies an entire lack of, or disassociation of, the emissive discharges necessary for the normal functional activity of the upper neuron group. The second, an ungoverned group of lower neurons having their centers in the spinal cord, which now act with abnormal independence either because of faulty inhibitory control from above, or because of equally faulty stimulation from the same source. (The latter may be seen in the athetoid and snake movements, especially of the arm, on volitional attempts.)

As stated by Kuttner, "the subcortical centers are continually spurred but no longer bridled."

"Before the age of three or four months, though sometimes in slight cases not until the time for walking arrives, the nurse perceives that the infant never thoroughly straightens the knees, that these cannot be properly depressed or separated, that she is unable to wash and dress the infant with the ordinary facility; that the hands are not properly used."

Usually the infant is not presented for inspection to the physician until several months have elapsed, three or four or more, when the mother becomes anxious because of peculiarities in the movement or stiffness in the extremities, or has been alarmed because the infant's head is retracted, or unable to be held erect—especially this latter. She may have had difficulty in dressing the infant because of its bodily rigidity, a condition frequently described by the mother when turning the child in dressing, as a movement of the body "all of a piece." (Little.)

In the course of months the fully developed spasticity has produced a state varying with the amount of nerve tissue destruction upon which it is dependent.

The train of symptoms following these initial peculiarities first noticed by the mother, is the failure to develop at the average period of infantile growth those attributes possessed by the normal child. The first birthday fails to reveal the ability to sit unsupported or even to hold the head erect; standing is impossible and the attainment of this feat, one of the latest in muscular ability, which is explicable from the fact that paraplegia is the most pronounced evidence of spastic paralysis. The ability to speak is likewise much delayed—even until the fourth or fifth year—and in severe cases is never accomplished, while in others this faculty may be but little affected in later years.

Coördinate movement of the upper extremities in diplegic cases is likewise not only greatly delayed in appearance, but is often never accomplished, these children being unable to feed themselves by holding their bottles or to grasp objects voluntarily, even if it be food, in their disabled hands. There is a species of volitional snakelike movement of the arm, and the object sought for by the child may be repeatedly pushed away by the back or palm of the hand before coming within the grasp. At times the fingers are habitually held in a position of close flexion, so that objects placed within the hands are retained for a time.

The inability to stand or walk continues for four or five years, when the child contrives to stand with support and to walk with assistance. The gait, however, is far from normal. The soles of the feet are not properly approximated to the ground. The child walks largely upon its toes in a position of equinovarus; the knees are bent and inclined inwardly, while progression is accomplished by a series of stiff, springy, forward movements in which the maintenance of balance is most difficult. Running seems sometimes easier to accomplish than walking. The toes catch easily upon slight obstructions in the path and to avoid this difficulty, as the child grows older, the toes are swung out in a circular way from the axis of the body. As time progresses greater facility in walking is accomplished, although spasticity and springiness of the act is never lost.

These babies and children are always puny, underweight and even atrophic. This is largely due to difficulty in feeding and the inability to swallow solid or semi-solid food up to an advanced age of childhood.

During feeding and even at times of rest the child makes most peculiar noises in the throat, "choking sounds," they have been called. There is frequently laryngeal stridor, which probably depends on damaged nerve innervation just as much as the plegias of other parts.

The subsequent progress of the victims of this malady depends much on the degree of physical and, especially, of mental impairment. As is the case with Mongolians, they frequently succumb to intercurrent diseases in childhood.

There is almost always impairment in intellect. "This may be slight and evidenced simply by excessive unsteadiness in the application to intellectual pursuits; great irritability of temper, or, more severe, causing ungovernable temper, uncontrollable tendency to destroy objects, hebetude and weakness of every intellectual faculty, and even complete idiocy." (W. J. Little.)

Those reaching adult life are never bereft of the telltale evidences of the spastic paralyses. There are to be seen several instances of adult types of Little's disease in the streets of this city at the present time.

The fate of those whose mentality has been seriously damaged is confinement to institutions for the feeble-minded or hospitals for the insane.

Sachs and Peterson[7] claim intellectual defects exist in 71 per cent. of the diplegic and 82 per cent. of all paraplegic cases.

The picture of the disease during the various stages of its course may best be obtained from the citation of the following cases:

CASE I. Baby M., aged nine months. This is the second born of an apparently healthy mother. The father is unusually robust. There is no luetic history in the parents, so far as can be ascertained. The first child, now aged three, is normal in every way, but precocious. The first baby was born at term.

The second baby was born two months before term, weighed 5 pounds, cried feebly at birth and then not at all for a month, but would moan quite frequently. Was fed with a dropper for several weeks and finally placed on artificial feeding, as the mother was unable to nurse.

The mother states that the premature birth was brought on by over-exertion during the latter months of her pregnancy.

Examination shows a badly nourished infant; weight, 13 pounds (approximate weight should be 18 pounds). As it lies in its mother's arms, the head is retracted, not so much from spasticity as from weakness of the neck muscles; cannot hold head erect unsupported. Takes feedings badly and will not take over 6 ounces in most instances. Asymmetry of the face. Difficult to attract the attention of the eyes, internal strabismus of the right eye. Upper limbs moved aimlessly as in a newborn child; no attempt to grasp objects, fingers flexed almost constantly; objects held for a short time when placed within the hand. Trunk inclined to rigidity and there are frequent movements in which the body is thrown back, especially when irritable or crying, in a position of moderate opisthotonus. Legs spastic; when at rest are flexed on the abdomen, with the knees frequently crossed. When moved the legs have a "lead pipe resistance," as it has been called. Spasticity of leg muscles, especially of the adductors. Exaggerated knee-jerks. Cannot sit up alone. Baby extremely irritable, cries inordinately, especially when dressed or undressed. He has a peculiar stridulous like respiration, which seems to be a common symptom among these unfortunates. Knows its mother and her voice and objects to being handled by a stranger.

CASE 2. Baby H., aged twenty-six months. *Family History*—Mother, aged forty, at age of eighteen had a fall with a resulting retroversion of the uterus; was afterwards curetted for dysmenorrhea. Married five years before the birth of this baby. Three years after marriage had first pregnancy and was delivered of a six-months premature, which cried at birth, but soon succumbed. Some time afterwards had an Alexander's operation performed and shortly thereafter became pregnant. Father at age of seventeen had a "stroke of apoplexy and aphasia." "It was absorbed by potassium iodid." At age of thirty contracted syphilis and was treated "rather carelessly" for a year with K. I. and mercury. Five years later had what he calls an attack of "abortive typhoid." When he got over this illness he had great difficulty in getting about because of an affection of both legs and has always used a cane since then. Is now aged fifty-six, walks with a spastic, difficult gait, catches toes easily on slight obstructions and really looks typical of a late Little's disease. He has no doubt had cerebral syphilis, or spinal syphilis—probably the former.

Baby's History—Was delivered at "what was judged to be full term," but "the doctor, when he sent us to an orthopedist, told us to say it was an eight months' baby." Dry labor lasting fifteen hours, but not especially difficult. Cried well at birth. His father states that "he was badly jaundiced after birth; however, with this handicap (and for the first week I doubted his living) he started off well, except that his neck was weak." This baby had a stormy first year on artificial feeding. He has never been able to hold his head erect but for a few minutes. He cannot even now sit alone. He has formed a vocabulary of half a dozen words and includes in this certain sounds of his own manufacture to indicate father, water, and the fact that he is wet. Puts two of these words together, namely, "on car," when he is taken on the trolley.

His present state of development is not far in advance of the first case recorded. His legs are spastic; his trunk frequently thrown back and stiffened; he does not reach for objects, but holds them for a short time when placed in the hand. His mentality is far below par. Weight, 18 pounds; should be approximately 28 pounds. His eye grounds reported normal by the ophthalmologist. Wassermann tests not yet reported at present writing.

CASE 3. B. M., aged five years. This child was born approximately two months before term. Both parents apparently healthy. This is the only child. The mother enjoyed good health during her pregnancy, nor was there accountable reason for her premature delivery. She was in labor from 9 A.M. until 6 P.M. Her labor was not difficult and no instruments were used. The child cried at birth.

This child during its first year had to be artificially nourished and always presented difficulties in this regard, remaining weak, atrophic and physically underdeveloped. The infant seemed to have difficulty in sight and a later examination disclosed double cataract.

The child is now five years of age, can sit alone and for a time can hold head erect, but soon tires. It has never walked, never talked and has never been able to take solid food. The cataracts have been repeatedly operated upon and there is evidently some degree of vision.

This case is one of the extensive diplegic types with marked intellectual involvement belonging in a class which gives the least encouragement from a prognostic viewpoint. The child sits in a chair especially contrived to give support to its feebly developed musculature. His nourishment consists of milk and such foods as may be administered in milk or gruel as a vehicle.

CASE 4. D. C., aged nine years. The first born of apparently healthy parents, in neither of whom was there luetic, tubercular or other disease taint. Subsequent to the birth of this child, the mother had a premature labor at seven months and was delivered of an acephalic monster. A still later pregnancy resulted in the birth at term of a normal child, who is now four years of age and well.

The first child, a girl, was born after a long, tedious and painful labor. The position was L. O. A. Forceps were being sterilized to aid delivery when nature accomplished the same unaided. The child was born deeply asphyxiated, but vigorous use of hot and cold baths, stimulants, flagellation and artificial respiration resulted in the establishment of permanent rythmic respiration is one hour and a quarter. During her early years the child presented the appearances noted in the previous infantile cases. She has never been able to walk, but progresses from room to room in a "baby walker" made especially for her needs. At the present time she has passed from my observation, but from a member of the family the present record has been obtained. "D. is not able at all to walk alone. She can stand alone in a corner for a few moments, but then collapses like a paper doll. I watched her yesterday for a half an hour, and during this time she was hardly still a moment, but was moving her hands about aimlessly for most of the time." (She has always displayed these "snakelike movements" of the upper extremity.) "To test her control of her hands, I put my bracelet in front of her and told her she could play with it. She tried for two or three minutes to pick it up, part of the time with her hands out perfectly flat, and part of the time with her fingers bent strongly backwards. Finally she picked up the bracelet in her clawlike fingers, not in a hand grasp, but could only hold it a moment. She cannot hold a cracker or feed herself at all. She can tell time and read a little, but while she seems to understand what she is reading, it is a terrible effort for her to express herself, which she does in a peculiar enunciation which is intelligible only to the members of her family and from which a stranger can gather very little."

This child represents one of the rather extreme diplegic or tetraplegic types in which the mentality, while seriously affected, has not been altogether stunted. Her speech emissive centers and innervation of her vocalizing musculature have not escaped. She has always made peculiar raucous laryngeal sounds during her life. Her receptive visual and auditory apparatus seem intact.

Diagnosis.—This usually offers no considerable difficulty. I believe we should differentiate as cases of Little's disease those spastic paralyses which have their origin before or during the act of birth, so that it will become necessary to exclude in diagnosis various paralyses of a spastic type which are produced by lesions occurring subsequent to the act of birth. The spasticity, exaggerated reflexes, lack of atrophy, except that of non-use, should serve to differentiate these cases from spinal lesions of various sorts in which the lower neuron has suffered damage. Peripheral palsies, even if spastic, which is rare, should be eliminated, although they may occur at the time of birth.

There is some difficulty during the early months of infantile growth in establishing the diagnosis of Little's disease, although the suspicious spasticity of the extremities, weakness of the neck and back muscles and trunk stiffening may lead to a correct interpretation. It is after certain epochs of infancy are passed without proportionate development of musculature and intellect that symptoms become prominent enough to warrant a definite diagnosis—especially if coupled with a prenatal or birth history of indubitable importance.

Prognosis—Taken as a whole, this is not very hopeful. Paraplegic forms of the disease with little mental defect are the most encouraging ones. These may live to adult years, the paralysis gradually improve so as to allow of walking and the intellectual development keep pace quite with the body growth. Diplegic types are usually destined for a graver prognosis, for accomplishment of the finer movements of arm muscle coördination rarely occurs. If the nerve damage has been sufficient to produce diplegia, there is almost always serious mental defect. These children grow up feeble-minded or idiotic.

Savariaud[26] has rather aptly classified the types with some prognostic significance as follows:

First degree—The little patients hop along on their toes, with knees slightly bent and knocking against each other in walking; the active limb describing a segment of a circle about the other limb. In these cases the upper limbs and intellect are unaffected.

Second degree—Walking may still be possible, but it is difficult and one arm is usually affected.

Third degree—Walking and the erect posture are impossible and sitting is only practicable by aid of sundry devices, as strapping in a chair.

Fourth degree—Both upper and lower limbs are paralyzed and contracted and the sufferers are quite impotent, being unable to feed themselves or to hold a pen, and intelligence is at a very low level.

Fifth degree—The victims are nothing more than paralytic idiots, and the congenital contracture plays quite a subordinate part in the clinical picture.

Treatment—There is hardly a more distressing class of diseases than this which comes within the care of the physician. Congenital rigidity is the bane of the pediatrist and the orthopedist.

There is hardly a more trying experience than to watch the development, or, rather, the lack of development, of these infants. There is often so little to offer the mother in the way of hopeful prognosis, and there is the ever-present doubt concerning the amount of mental incapacity that will result.

In the way of prophylaxis it would seem that much might be done to lessen the number of lives brought into the world with the blight of this affection upon them.

Prematurity still forms too large a group as a cause of infant mortality and morbidity, the latter especially from the viewpoint of this discussion. The induction of premature labor as an obstetrical procedure should not be undertaken without due consideration of the extreme dangers to the maternal offspring; if not its immediate death, perhaps the sentence of practically a living death, should it fall a victim to spastic paraplegia.

The prevention of syphilis Williams[27] places first among the actual preventable causes of infant death and disease.

The whole problem is that of prenatal care, into a discussion of which we may not enter here, as its scope is as great as the attention it deserves.

The same degree of prophylaxis should enter into the obstetrical management of parturition. The etiological bearing of prolonged or forcible labor has already been sufficiently emphasized.

Abt[28] thus vigorously states the relation of asphyxia neonatorum to the production of these cases: "A serious complication of labor is asphyxia. It may be caused by the mother or by the fetus. Disorders of placental circulation, mostly toward the end of labor, early loss of amniotic fluid, respiratory and cardiac disorders, disruption of the placenta, compression of the cord and cerebral pressure can mostly be prevented or moderated by appropriate aid. Asphyxiated babies may die, however, within an hour or the first few days. Those who do not so die are apt to be worse off. They are apt to become paralytic, idiotic, or epileptic. Little shares the opinion that a large percentage of cases of spastic encephalitis (Little's disease) is produced by congenital asphyxia. Hundreds of times, both in obstetric and pediatric practice, Jacobi, when looking for etiological factors, has received the uniform answer that the baby did not cry for some time after birth, and that the attendant had to work over it minutes, or even hours. Asphyxia must not be tolerated. A few moments' delay adds to the danger which may be averted by knowledge and skill. Losing a baby is a loss and bereavement; crippling it for life is worse."

In cases giving a history of syphilis in the parents, or showing a positive Wassermann reaction, antisyphilitic treatment is indicated. Instances have been recorded in which such medication has produced an amelioration of the symptoms. (Fournier and de Tourrette,[29] Gallois and Springer.[30])

In many instances, however, the presence of syphilis in the parents has exercised antenatal influences which no amount of treatment in the child will ameliorate.

The immediate surgical treatment of intracranial hemorrhage, first modestly suggested by McNutt,[18] has been practiced by Cushing and others with success. The class of cases to which it is applicable is, however, limited and the selection of these difficult.

The treatment of fully-developed cases of spasticity falls within the function of the orthopedist or surgeon. It is interesting to note how many varied efforts have been made to relieve the spasticities and contractures of Little's disease. These include all forms of tendon cutting, lengthening and stretching. E. M. Little quotes Lorenz as cutting ten tendons at one sitting. The adductor tendons have been repeatedly cut, and even the entire tensor vaginæ femoris exsected. (Gibney.[31])

Foerster, of Breslau, in 1908 first applied an operation bearing his name for the relief of tabetic pain. He later extended the scope of his technique to the resection of certain lumbar and sacral roots for the relief of spasm. He divides alternate roots, as the second, third, fifth lumbar and the second sacral, leaving the first lumbar, fourth lumbar and fifth sacral intact. This operation is especially popular on the continent, where it is spoken of very highly. It does not seem to have become popular in America. (Codivilla,[32] Foerster,[33, 34] Van Gehuchten.[35])

William Sharpe and Benjamin P. Farrell,[36] of New York, have reported some exceedingly interesting and hopeful results following decompression operations, which are applicable, however, only to those cases which have a definite birth origin. So far they have reported the results of operations on 65 cases out of 201 cases of spastic paralysis examined; that is, 1 out of about every 3 cases examined with a view to possible treatment by decompression.[37] Their method of selection depends upon the history and an examination of the eye grounds. "In those cases of spastic paralysis of the hemiplegic, paraplegic or diplegic type, with a definite history of difficult labor, with or without the use of instruments, in which, on ophthalmoscopic examination, signs of intracranial pressure are shown in the dilated retinal veins and a blurring and haziness of the optic disks, especially of their nasal halves, a large right subtemporal decompression is performed to relieve the intracranial pressure. If the intracranial pressure is extremely high and remains high after the operation, a left subtemporal decompression is performed the following week, the operation recovery requiring only a week or ten days."

These writers in their conclusions state: "We wish to repeat that this paper is merely a report of work being carried on to improve the condition of selected cases only of spastic paralysis. It is by no means a cure, and possibly the improvement in our selected cases is but a temporary one—we cannot tell. But from the pathology of these selected cases, in which operation has been performed and the general continuous improvement which has resulted and is still progressing, we feel justified in making a report of the work in the hope that it may throw some light on the treatment of this very pitiful condition."

The results obtained by Sharpe and Farrell have certainly not been equalled by any other method of operative procedure, and it is to be hoped that their methods will be found to be of permanent value in the relief of these plegias, even if they be limited to a group which represents but a third of the cases encountered.

Eliminating this limited group which may be benefited by operative methods, there remains the larger number in which the blight of disease has been of antenatal origin, to remove which is impossible, but the prevention of which should receive that earnest consideration which it so well merits.

The elder Little found but brief mention in the literature available to him referring to the disease which bears his name, but in his review he found that Shakespeare had not overlooked the malady in question, which Little believed to be the affliction borne by Richard III., who, according to Sir Thomas More, was borne by his mother, the Duchess of Gloucester, after a difficult travail in which the infant appeared by the breech.

The unfortunate Richard in his soliloquy says:

> "But I, that am not shaped for sportive tricks,
> Nor made to court an amorous looking-glass;
> I, that am rudely stamp'd, and want love's majesty
> To strut before a wanton ambling nymph;
> I, that am curtail'd of this fair proportion,
> Cheated of feature by dissembling nature,
> Deform'd, unfinish'd, *sent before my time*
> Into this breathing world, scarce half made up,
> And that so lamely and unfashionable
> That dogs bark at me as I halt by them."

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ETIOLOGY OF TETANY—Reviewing the literature and describing their metabolic and clinical studies, A. Brown and A. Fletcher (American Journal Diseases of Children, 1915, Vol. V., p. 313) say that tetany may be produced by high carbohydrate foods which have been subjected to heat up to or over the boiling-point. The monthly incidence of tetany is probably due to a disturbance of the gastrointestinal tract (constipation), decreased internal combustion and the comparative safety from diarrhea in feeding high carbohydrate foods during the cold months. A diagnosis of tetany is suggestive when there is manifest kidney inactivity in constipated infants fed heated foods of high carbohydrate content. As a result of this improper feeding there is produced a disturbance of the body salts. At the height of the disease there is an almost complete retention of sodium and potassium (the irritating salts) and a great loss of magnesium. As improvement ensues there is an increased flow of urine accompanied by a relief of the constipation, during which the stored-up sodium and potassium are rapidly lost. This salt disturbance may be remedied first by purgation, second by diuresis, third by the administration of cod-liver oil and phosphorus to build up the calcium content, and fourth by a change of diet. The severe spasms or convulsions may be temporarily relieved by subcutaneous injections of a solution of magnesium sulphate.—*American Journal of Obstetrics.*

TREATMENT OF DIPHTHERIA BACILLUS CARRIERS WITH SPECIAL REFERENCE TO THE STAPHYLOCOCCUS PYOGENES AUREUS

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In the Lancet-Clinic of August 31, 1912, I reported the results of 2 cases which were treated by the method recommended by Schiotz and Page, namely, with fresh broth cultures of the staphylococcus pyogenes aureus.

One of these became negative in two and the other in two and one-half days. When used under my supervision it has never failed to bring about the desired results in from one to two and a half days—usually in twenty-four hours. Probably a lack of understanding of the details of laboratory technique and clinical application has been responsible for its limited use.

In 1910 Schiotz noticed an apparent incompatibility between the staphylococcus and the Klebs-Loeffler bacillus. Staphylococcus sore throats did not acquire diphtheria and intercurrent sore throats cleared up positive cultures. Several cases treated with the staphylococcus spray became negative.

The following year Henry Page of Manila, made a rather scientific observation upon the subject. Two guinea-pigs, inoculated with a bouillon culture from a throat, which was later sprayed with the staphylococcus aureus, died within forty-eight hours. On obtaining four negative cultures, following the application of the staphylococcus, cultures from this same throat injected into guinea-pigs produced no effects.

Since that time rather frequent references have been noted in the literature upon this subject by writers who have variously reported their results. They have been mostly favorable; some not so. Among the contributors are Schiotz, Page, Lorenz, Ravenal, Lake, Bell, Rolleston, Weil, Weimer, Sleck, Wade, Arms and Blanchard, Catlin, Scott, Day and others. Some results have been brilliant, some fair, and still others failures.

I have suggested that the inability to bring about successful results has been due in many cases to improper laboratory and clinical technique. We could not with reason hope for much if we handed the spray to members of different families with the instructions "to use it three or four times daily," as was done by one writer, who reported that "it was not effective." It is not to be regarded as a household spray. In all probability there was not a single point in the preparation of the culture or the clinical application which was properly carried out. Undoubtedly there are many such instances. Cases have been reported as successes or failures with no mention of the method applied. As far as I know there has never been published any detailed account of the technique and *this is the all-important point.* Let us briefly state the method which we found successful.

When the need for the staphylococcus treatment became apparent a stock culture of the staphylococcus pyogenes aureus was obtained from the Pathological Building of the General Hospital, which proved to be either dead or so far attenuated as to be useless for our purposes. In the wards there was a patient suffering from abscesses, so we inoculated an agar slant with some pus, which was obtained under strictly aseptic conditions. This was incubated about twelve hours. At the expiration of that time a luxurious growth was obtained. Three agar tubes were melted and one loop full of the twelve-hour growth was transferred to the first tube. One loop full from the first tube was transferred to the second tube, and one loop full from the second tube was transferred to the third tube. The melted agar tube was transferred to the third tube. The melted agar was then poured into sterile Petri dishes, and they were then incubated twelve hours. At the end of that time colonies were picked off the growth in the Petri dish possessing the highest dilution, and examined microscopically. Colonies of a pure culture of staphylococcus were found. A culture was made on plain agar, and at the end of twelve hours' growth at body temperature we had a pure culture of staphylococcus pyogenes aureus. This became our stock culture. Each night (A) a slant of plain agar was inoculated with the staphylococcus from the stock culture and incubated twelve hours. (B) At the end of this time (every morning) two loop fulls of this twelve-hour growth were transferred to a 5-ounce mixture of broth, composed of salt, peptone and Liebig's beef extract and water, having previously been bottled and sterilized.

This is the broth culture which was applied to the noses and throats of the carrier cases, but was only in use twelve hours, after which time a fresh culture was made as previously indicated, Processes A and B were repeated until desired negatives were obtained. If the staphylococcus growth is not luxuriant, B could be incubated for twelve hours before using. Our results were formerly obtained, however, as previously outlined. Only cases which were *clinically well* were used. In throat cases the house staff were instructed to swab the tonsils once daily with the broth culture, being careful to get around the tonsils and *into the crypts.* The latter is quite important. Afterwards the nurses were instructed to spray the tonsils every two to three hours while holding the tongue out of the way with a depressor.

Probably it would be well to keep the spray at a temperature of 96°F. In the case of nasal carriers, where much congestion of the nasal mucosa is encountered, a 1½ per cent. solution of cocain in younger children and a 3 per cent. solution in older children is first used and then thoroughly swabbed once a day with the staphylococcus broth. Following this, the spray is used every two to three hours, as in throat cases.

Case I. H. W. Measles, with three doubtful cultures (types A_2 C_2). Following the use of broth the three successive cultures were negative.

Case II. A. W. Measles, with three doubtful cultures (A_2 C_2 D_2). After broth, three successive negatives were obtained. (In all cases it will be understood that negative cultures followed the use of the broth.)

Case III. A. B. Diphtheria, had seven positive (A, C and D) and five doubtful cultures (A_2 A_2) ending July 30th. July 31st and August 1st were negatives.

Case IV. M. K. A nurse. Diphtheria, with five positive (A and D) and six doubtful (A_2 C_2 D_2) ending July 28th. July 29th and 30th were negative. Ten, eleven and twelve days later three additional cultures were obtained. In the interval the broth was not used.

Case V. H. R. Nurse. Diphtheria, had three positive (A and D) and six doubtful (A_2 C_2 D_2) ending July 30th. Cultures July 31st and August 1st were negative. In from ten to thirteen days later three additional negatives were obtained, with no broth treatment in the interval. Almost a pure culture of the staphylococcus was reported.

CASE VI. C. M. Diphtheria, previously a large number of positive (A_2, C, D and D_2) were obtained. Broth was at once used with resulting negatives on three successive dates.

CASE VII. S. P. Diphtheria, had many positive (2) and doubtful (5) cultures. After a doubtful culture, broth was used with four successive negative cultures following.

No reaction or unfavorable symptoms have ever been observed in the use of the broth.

In looking over this series of cases we see in all of them the rather remarkable fact that, after running a number of positive and doubtful cultures over a period of many days, within twenty-four hours in each instance after using the staphylococcus broth, a negative is obtained. On each successive day the result has been the same.

It has been suggested in criticism of this method that the bacilli have not actually disappeared, but have been overrun by the staphylococcus. Two of these series, nurses, remained under our observation for from ten days to two weeks after obtaining their first negatives. At the end of this time, without further local treatment in the interval, three additional negative cultures were obtained.

If the bacteriologist had not discarded an inert culture, or if the routine in the wards, especially in *swabbing the crypts*, had been improperly carried out, the results would have been quite different. After returning to the hospital from a short vacation I was told by the house staff that the carrier problem had driven them almost to distraction and the staphylococcus broth had proven a failure. On inquiring as to the procedure instituted, I was told that the nurses were syraying the throats *three times daily with no swabbing.* That was the explanation. When this was corrected the result was the above series of cases.

We are able to add to the above the histories of 4 additional cases of very recent occurrence which, because they are illustrative of several points insisted upon in this article it seems desirable to report:

For a period of several weeks our regular bacteriologist had been absent on a vacation, leaving his work in the hands of a substitute. During this time the cases treated with the staphylococcus broth showed most unsatisfactory results. On his return he found that the culture which had been used was entirely *inert.* A fresh culture was made with the results as outlined in the following cases. The culture which was used in his absence will be referred to as the "inert culture." In this series the *broth culture* was incubated for twelve hours before using and applied clinically for the succeeding twelve hours.

Case VIII. J. L. Measles, on attempting to discharge, two positive throat cultures were obtained. Following the use of the staphylococcus broth eight succeeding cultures were negative. Broth was used for first three days.

Case IX. E. M. Diphtheria, after fifty-one days in the house throat cultures were found to be persistently positive. "Inert broth culture" was used for twenty-one days with no results. When fresh broth was used cultures became immediately negative and eleven successive negatives were obtained. The spray was used only during the first three days.

Case X. W. P. Laryngeal diphtheria, after three months, cultures from throat were positive. Following the use of staphylococcus broth eleven successive cultures were negative. Broth used first three days.

Case XI. E. K. A carrier on admission. Clinical symptoms negative. This child was our most troublesome case, with persistent positive cultures from both nose and throat. Kaolin was used for nine or ten days with throat continuing positive or doubtful. "Inert broth culture" was tried for about thirty-three days, with cultures from nose and throat alternatively negative, positive or doubtful. A fresh broth culture was commenced with immediately satisfactory results. Nine successive negative cultures were obtained, the broth treatment having been discontinued after three days.

These cases again illustrate the necessity of using a broth culture which is *not* inert. It will be observed that the broth was incubated for twelve hours before using and this we consider desirable. With a dependable broth culture these cases became negative practically at once and remained so for from five to eight days after all treatment was discontinued. In the interval daily cultures were taken, after which time the cases were discharged.

The use of kaolin (aluminum acetate, kaolinum, fullers' earth and bolus alba, essentially similar substances), because of its well known absorptive powers, has been used by Hektoen and

Rappaport in the treatment of carriers. It is used in the form of a dry powder, which is blown into the nose at two-hour intervals during the day. They suggest that, when there is much nasal obstruction, the removal of bacteria is more difficult. In applying it to throats, adults and older children are instructed to swallow one-third teaspoonful of kaolin four or five times an hour during the day.

With younger children it is more of a problem to know how to apply a sufficient amount to the throat to bring about the desired result. The plan of mixing kaolin with sugar occurred to them.

Removal of diphtheria bacilli was reported in from two to four days.

Ott and Ray recommend applications of iodized phenol (60 per cent. phenol, 20 per cent. iodin and 20 per cent. glycerin), for the removal of diphtheria bacilli. They suggest swabbing the throat and nose with this solution every forty-eight hours and claim to have gotten negative cultures in from two to twelve days. Some immediate pain, a superficial slough with inflammatory reaction for several days, accompanies the treatment. Personally we see no reason for using this plan because of the unpleasant effects.

Through the courtesy of my colleague, Dr. Julius Eichberg, and the kindness of Dr. C. H. Andrews, of the house staff, I am permitted to include the report of 8 cases treated with kaolin. The longest time in obtaining negatives, viz., the beginning of a series of three successive negative cultures, was thirteen days; the shortest time one day; average time a little over six days.

The two cases in whom negative cultures were obtained in twenty-four hours had one doubtful culture each, and no positive cultures. In 1 case kaolin treatment was discontinued before negative cultures were obtained. They became negative following applications of Lugol's solution.

The treatment in several of these cases had been supplemented with applications of 1 per cent. phenol and Lugol's solution.

The method consisted in spraying the nose and throat every three hours with kaolin powder or *eating* a half dram of kaolin every hour. The latter seemed to give the better results.

Among the many long-tried procedures for getting rid of carriers may be mentioned the familiar application of bichlorid solution from 1-12,000 to 1-1,000, tincture of iodin, peroxide, phenol, Lugol's solution, etc., with results that were never encouraging.

P. H. Miller, New York, suggested the use of formaldehyde solution varying from ¼ to 1 per cent. of the usual 40 per cent. solution. This is to be used every three or four hours and the solution prepared *daily* and *used* warm. According to the writer three to six days' treatment may be required.

A tonsilectomy would undoubtedly clear up the carrier situation if the throat is the seat of the trouble. A radical procedure like the above is not popular in a contagious hospital, or while a patient is in quarantine. However, where the tonsils are large and have been the cause of much previous disease, after complete recovery, this question must be seriously considered.

Recently Lewis* has suggested some interesting features concerning the carrier problem. All cases showing nasal discharge, and acute hyperemia with pharyngeal hypertrophy were cultured. If positive cultures were found they were isolated. Exposed individuals *without clinical manifestations* were not isolated even though they showed positive cultures. No case of diphtheria could be traced to those giving the negative physical, but the culturally positive findings. The results reported were a reduction in the spread of the disease of from 50 to 75 per cent.

This favorable showing is undoubtedly due to the thorough and systematic individual inspection, as in this way few cases are missed. When acute symptoms are present contacts become more dangerous. It seems to us, however, that all cases showing positive cultures should be isolated until negative, or at least kept under surveillance, unless the virulence test has been applied. A subsequent tonsillitis or coryza may develop in them and pass unnoticed.

Zingher and Soletsky have pointed out that in carriers from 30 to 50 per cent. of the bacilli, morphologically and culturally similar to the Klebs-Loeffler, are not virulent.

Neisser's figures are 20 per cent. This could only be determined by animal inoculation. The technique connected with this involves sufficient time and labor to make it prohibitive, except in unusual cases.

According to Park and Zingher vaccines made from the Klebs-Loeffler bacillus have completely failed to rid carriers of their organisms.

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* Journal American Medical Association, May 13, 1916.

In comparing the various methods as outlined by the results enumerated above, we may draw the following conclusions: The kaolin treatment, or the various local applications, may be tried first because of their simplicity, especially in private homes, but the desired result is not accomplished as quickly; average time in series over six days.

In all probability it is much inferior to the staphylococcus spray in nasal cases.

The broth culture of the staphylococcus pyogenes aureus, when applied properly from a laboratory and clinical standpoint, is a *safe and successful* method of combating the carrier problem.

While it is not claimed that there is any antagonism between the Klebs-Loeffler bacilli and the staphylococcus, the bacilli disappear and cultures when taken after treatment has ceased, remain negative. Probably the majority of cases would show negative cultures in three days.

Each of our series became negative in twenty-four hours when a dependable broth culture was used. Its greatest use will be in hospital cases, applied only in typical carriers which are clinically well and should be used in all stubborn cases.

I wish to express my appreciation of the efficient service rendered by Dr. L. N. Lindenberger, upon whom I relied for the laboratory technique and findings, and Drs. Hopkins and Thureson of the house staff, for their careful attention to details in the wards.

Reading Road and Ridgeway Avenue.

CITRATED WHOLE MILK—E. Pritchard (Practitioner, 1916, Vol. XCVI., p. 144) believes that the "citrated whole-milk" method is physiologically unsound, because it allows no latitude for adaptation to the individual's digestive, assimilative, metabolic, and secretory activities, and that its use imposes obligatory modification of the infant. Secondly, that it affords little scope for the study of the influence of variations in the diet. Thirdly, that if the principles of percentage feeding are understood, a satisfactory food can be synthesized in a great variety of ways to satisfy the physiological requirements of any particular child; and, fourthly, that dried milk, if properly modified and of good quality, has all the advantages, and few of the disadvantages, of so-called dairy milk.—*American Journal of Obstetrics.*

A CASE OF PURPURA FULMINANS

BY W. M. DONALD, M.D.
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This disease is so exceedingly rare that the report of a case which has just passed through my hands should possess points of interest and value.

E. L., aged four, a bright lad who had always been perfectly healthy till this summer, was on August 7th taken with an attack of dysentery. The attack was a sharp one and demanded very close watching, but the little patient recuperated nicely in a week, my last visit being on August 15th. The stools had been bloody and contained mucus, the fever had been moderate in degree (about 102°F.) and the general condition had been that of a patient suffering with a dysentery of moderate severity. He was well until September 27th, eating, as his mother said, "like a little pig," and apparently being in the most vigorous health. About September 27th he commenced to ail, and I was sent for on account of what seemed to be a general malaise and general disturbance of the system, which was attributed to overeating. He was, however, noticeably pale, and, his pallor attracting my attention, I asked for and secured a specimen of urine. This was found absolutely negative, and left me somewhat in the dark as to the cause of the noticeable pallor. On my next visit, two days later, he seemed about the same. His mother, however, called my attention to a few ecchymotic spots on the body and lower extremities, which she attributed to injuries and characterized as "bruises." They were not markedly significant and received scant attention. I did not see him again until October 5th, six days after the previous visit, when I was sent for and informed that the patient did not seem to be improving.

The mother, a day before this, had taken him to a dentist and had an ugly-looking incisor root removed, thinking that this might be keeping up some of his toxemia. The trauma in the gum had continued to ooze slightly ever since the extraction, and the next day his nose on the right side commenced to bleed. The oozing in each case, however, both in the gum and in the nose, was exceedingly slight and was suggestive rather than alarming. Simple remedies were applied and I arranged to call two days after. Early in the morning of the day that I had arranged to return, I was summoned hurriedly on the statement that the boy was very gravely ill with a high fever and with general disturbance. I repaired hastily to the house, and found him with a temperature of 104°F., a pulse of 130, respirations of 25, and the body the seat of numerous new ecchymoses. Punctate petechiæ were scattered all over the anterior surfaces of both legs, from the thigh to below the knee. The nose bleed was still present and the oozing from the gums still more pronounced. I recognized the gravity of the case and at once asked for counsel. On the request of the parents I summoned Dr. Charles Douglas, who saw the case with me within an hour. He concurred in my diagnosis of purpura fulminans, and advised the use of either human blood or horse serum for the control of the hemorrhage. The latter we selected as the most available. Two doses of this, forty-eight hours apart, gave complete relief from the hemorrhages, but notwithstanding the cessation of this unpleasant and dangerous symptom, the patient grew steadily weaker, and the symptoms steadily worse. Delirium supervened within a comparatively few hours, the patient refused nourishment, except in the most limited quantities, the bowels and urine were evacuated involuntarily, the pallor increased, suggesting internal hemorrhages, and the condition grew steadily graver. Some small blood clots were found, for the first twenty-four hours in the fecal evacuations, but the urine remained perfectly clear. The possibility of a lymphatic leukemia was considered in the case and careful search was made for the diagnostic signs of this disease. The absence of large lymph nodes or spleen with a perfectly negative blood picture negatived this possible diagnosis. Typhus fever was likewise considered as a possibility. The appearance of the petechiæ and ecchymoses previous to the onset of the fever, the absence of any likely source of contagion, and the lack of infectivity in the case itself formed an insuperable barrier against this diagnosis. The fact, however, that the boy had had a bacillary dysentery about a month before he was first taken sick with the subcutaneous hemorrhages, and the fact that purpura fulminans has been believed to be due to an invasion of the bacillus coli led us to consider the dysentery as a possible, or even probable, etiologic factor. The symptoms were, however, very suggestive of a typhus. The sudden onset of the disease, the high fever, the delirium, and the rapid termination of the case, corresponded very closely to the classical typhus, except that, as was said before, the hemorrhages antedated the fever. Typhus, as is well known, has a series of ecchymotic hemorrhages three to four days after the onset of the fever. With this exception the symptoms were so analogous to a typhus that one could not but wonder if the same or similar etiologic factors were not at work in both cases.

Seven days after the onset of the severe symptoms the patient succumbed to a cardiac asthenia. The treatment had been purely symptomatic and expectant. Careful blood examinations had been made, but no blood culture secured. I offer the case as an interesting clinical study, and as a contribution to the history of this remarkably unusual disease.

THE SIGNIFICANCE OF EXTRACTIVES IN NUTRITION—Hans Aron (Monats. f. Kinderheil., 1915, Bd. XIII., No. 8) says that every pediatrist recognizes that infants artificially fed with a food that contains a proper quantity of the various constituents of nutritious food, such as albumins, fats, carbohydrates, and salts, and which gives a proper caloric value may still fail in getting the best nutrition and lose in weight. When we add to the ration a small amount of sugar through the medium of flour and malt the nutrition improves at once and weight is gained. Organic compounds which are composed of water, albumin, fats, ash, and cellulose have been called extractives. What part these materials play in nutrition is still undetermined. The author tested on young rats a diet consisting of albumins, fats, carbohydrates, and salts with and without extractives, so as to ascertain the actual effect of the presence or absence of the extractives. The rats were fed with a mixture of casein, butter, and white starch with salt and bran. When the bran was present the nutrition was good, and weight was gained. If pure cellulose was substituted for bran, poor nutrition was caused, weight was lost and death finally ensued. The addition of a small amount of pure extractives from bran caused immediate improvement, lasting as long as the extractives were fed, and disappearing as soon as they were removed from the ration. Whenever these extractives were absent from the food there recurred loss of weight, poor nutrition and, if continued, death.—*American Journal of Obstetrics.*

SOCIETY REPORT

THE NEW YORK ACADEMY OF MEDICINE—SECTION ON PEDIATRICS

Stated Meeting, Held October 12, 1916

Royal Storrs Haynes, M.D., in the Chair

The subject of the evening was "Lessons to the Pediatrist from the Recent Epidemic of Poliomyelitis."

EPIDEMIOLOGY AND PUBLIC HEALTH PROBLEMS

Dr. Claude H. Lavinder, of the United States Public Health Service, invited brief attention to certain features of epidemiological studies upon this disease. He said: There are some difficulties connected with a study of this kind not always appreciated. The study of the epidemiology of a disease is often nothing more than the application of the principles of diagnosis to an outbreak of that disease. The data collected are the symptoms of the outbreak. If one therefore undertakes such a study of the outbreak of a disease the epidemiology of which is well understood, an epidemiological diagnosis is usually feasible and readily made within a reasonable time. Where, however, the epidemiological characteristics of a disease are not known, the study becomes a research problem and the result is, of course, a very different matter. This is somewhat the situation in regard to poliomyelitis. Epidemiological studies in their ultimate analysis are really studies of modes of infection. In poliomyelitis the mode of infection does not as yet rest upon a well established basis and the results of such studies are therefore neither sure nor certain.

When Wickman, in his classical studies in Sweden, in 1905, formulated the view that poliomyelitis is a contact disease, spread from person to person, and drew attention to the importance of abortive types and carriers in the transmission of the disease, he gave a view of the epidemiology of poliomyelitis, which has directed all studies subsequently made. An examination of the case cards of any more or less recent epidemiological study of this disease makes it evident that they are all constructed so as to make the study essentially an attempt to support or disprove Wickman's hypothesis.

The epidemiologist is confronted with two problems: (1) The explanation as to why, in comparatively recent times, apparently, this disease has assumed epidemic characteristics. (2) The finding of a consistent explanation of the method by which the disease is transmitted. Poliomyelitis apparently did not display any epidemic prevalence previous to the early eighties. Even then it appeared in only small groups of cases widely scattered, and very slowly gathered force as an epidemic disease, unexpectedly culminating this year in an epidemic whose proportions exceed anything yet recorded for this disease.

The present epidemic in New York City and the adjacent territory will probably number at its conclusion something like 20,000 reported cases. This entrance of poliomyelitis into the family of important epidemic diseases is a remarkable and unique development, for which there is no apparent explanation. With regard to the transmission in poliomyelitis, it may be said that since Wickman's time most epidemiologic studies have at least tended to confirm his views, and experimental work in the laboratory has likewise contributed to a similar result. Judging from our experience during this epidemic, in an intensive study of several hundred cases in various localities, it seems more than likely that the epidemiologic studies which have been made will show no great difference in their ultimate results. The conception of poliomyelitis as a contact disease in its widest sense, while receiving the qualified approval both of epidemiologic and experimental studies, nevertheless admits of some dubious points and shows not a few apparent inconsistencies.

From the epidemiologist's standpoint the present view of poliomyelitis is that the disease is due to a specific agent, of which the only demonstrated natural sources are infected human beings, that is, the recognized sick, convalescents, the mild "missed" cases and carriers in good health. The infective agent is known to be discharged from these sources in the excretions of the respiratory and digestive tracts. The infective agent, while known to be fairly resistant to destructive agencies encountered outside of the human body, nevertheless, presumably does not lead a saprophytic existence. Of great significance is the experimental transmission of the disease to monkeys by rubbing the virus on the intact nasal mucous membrane. It is also significant that infection through the digestive tract, or through the agency of biting insects, has been found more difficult and less constant. The total incidence of the disease in the population affected is usually small. It seems well established that the recognized cases of the disease are of far less importance in its transmission than healthy carriers and "missed" cases. Epidemiologic studies have indicated that contact is a method of transmission without, however, excluding the possibility of other methods. There are one or two marked characteristics of the disease which do not harmonize very well with our present conception as to its method of spread. These are a characteristic seasonal prevalence and an equally characteristic age incidence. Any hypothesis as to the mode of spread of this disease must be in conformity with these characteristics. Our conception of poliomyelitis is that of a respiratory infection spread by contact, and yet by analogy with all other respiratory diseases, poliomyelitis should prevail not during the summer, but during the winter months, whereas poliomyelitis corresponds in seasonal prevalence to gastrointestinal disturbances. This is a serious inconsistency which cannot now be explained.

As to the age incidence of poliomyelitis, children under five years of age constitute a very large percentage of the cases, although they form only a very small percentage of the population. Adults, forming usually over 50 per cent. of the total population, furnish but a small percentage of cases. This, together with the fact that the total incidence of the disease among the population is small, brings up the question of immunity. The most feasible explanation of these phenomena is the presumption of the wide prevalence of mild cases and the consequent development of specific immunity to the disease in a large part of the population. This explanation is unsatisfactory. There are other inconsistencies, such as the small percentage of secondary cases, the apparent paradox that the carrier is of more importance in the distribution of the disease than the case itself, the occurrence of cases among apparently well-isolated people, and the greater prevalence among rural than urban communities. Epidemiologic studies of poliomyelitis are very much crippled by our lack of knowledge as to any definite means of diagnosis, especially in the mild case and the healthy carrier. Because of our lack of definite knowledge as to the incubation period of this disease, and the fact that the mild case and the carrier are too frequently missed in consequence, the picture which the epidemiologist obtains of the spread of this disease is incomplete, and his conclusions therefore not so clear.

For the public health officer, whose function it may be to restrict the spread of an epidemic of this disease, poliomyelitis presents practically an impossible problem. The difficulties here again are the mild case and the carrier. The difficulties of the problem of the restriction of the spread of this disease do not excuse us from doing whatever may be possible to secure restriction, even in a small degree. Such things as the hospitalization of cases, supervision of contacts, and attempts to regulate travel, with some system of notification and other measures, while they may not restrict the spread of the disease in a large measure, may achieve the desired end at least in some degree. If our conception of poliomyelitis as a contact disease be correct, then any real restriction of its spread would seem to depend upon the development of some form of active immunization.

REVIEW OF THE SYMPTOMS OF ONSET COLLATED FROM THE CASES AT WILLARD PARKER HOSPITAL

DR. MAY G. WILSON stated that their study of the prodromal symptoms of infantile paralysis was based on the histories of 400 patients admitted to the Willard Parker Hospital from July 1 to September 1, 1916, inclusive. These histories were obtained by personal interviews with parents, corroborated when possible by the family physician. Every effort was made to obtain an accurate history of the onset and course of the disease prior to admission. The symptoms given in the report were those noted from the onset of illness until the appearance of paralysis. Falls, overexertion, unusual excitement, overeating and dentition preceding the onset were given as causes. The onset, as a rule, was acute, attacking an apparently healthy child unawares.

Fever was the most constant initial symptom, being noted in 334 cases; only 2 per cent. on careful examination gave no history of fever. The temperature rises rapidly, reaching its fastigium in twenty-four to forty-eight hours. The highest temperature noted was 106°, the average 103°; the duration was from one to ten days, the average being four days. The fever might fall by crisis or lysis. In cases of remission or relapse an initial fever of one or two days was followed by apparent health from two to six days, with a secondary fever and paralysis following.

Vomiting was noted as an initial symptom in 67 cases, as an early symptom in 132 cases, sometimes occurring after the child had retired and slept a while, more usually, however, immediately on taking food. The vomiting was seldom repeated; in one instance it was of a projectile character.

In 156 cases there was a definite history of persistent constipation for two or more days, resisting ordinary catharsis and only relieved by repeated enemas. Fecal scybala were often found on examination.

Diarrhea was not a common symptom in this series, being present in only 25 cases, and being neither severe nor characteristic. Abdominal pain was noted as an initial symptom in 21 cases; as an early symptom in 25 cases. When present it was usually severe, persisting for several days and referred to the epigastrium or general, and in two instances simulating appendicitis.

A study of respiratory symptoms showed that 21 cases complained of sore throat as an initial symptom. A red throat was noted in 27 cases, follicular tonsillitis in 14. The examination of 100 cases at the time of admission to the hospital showed injected fauces in 31 cases, enlarged tonsils in 11, exudate in 3 and a mucopurulent frothy discharge in 7. Epistaxis was present as an initial symptom in 2 cases, coryza in 17 cases, conjunctivitis in 9 cases, and cough in 38. There were 2 instances of severe bronchitis. As a group these symptoms were not common nor characteristic.

The most constant nervous symptom was an early and persistent drowsiness, noted in 288 cases, that is, 72 per cent., and varying from slight apathy to stupor in 47 cases. Irritability was next in frequency, being noted in 153 cases. Associated with irritability was marked hyperesthesia, noted in 97 cases, the slightest touch, or even approach, being resented. Tenderness and stiffness of the neck was an early and common symptom present in 130 cases, usually referred to the neck, back, shoulders and chest. Tremor was noted in 113 cases, sometimes limited to a single group of muscles, usually of the extremities. The tremor persisted during the febrile period, preceding the paralysis by twenty-four to forty-eight hours. Two cases showed a marked, coarse tremor persisting for several weeks, limited to one side of the body and resembling intention tremor; it was absent during sleep, but recurred on the slightest irritation. Twitching was noted in 64 cases, sometimes choreiform; it often preceded a facial paralysis. Headache was present in 78 cases, often persistent and severe; frontal or general headache was the first symptom complained of in 12 cases. Convulsions were present in 6 cases, as an initial symptom in 3. Two of these were children giving histories of previous convulsions. Delirium was noted in 10 cases.

There was a history of some urinary disturbance in 21 cases, usually minor retention.

The skin symptoms observed were profuse sweating in 45 cases, out of proportion to the fever present, and usually preceding paralysis. It was, as a rule, general; in a few instances localized. The rashes noted were blotches on the extremities in 2 cases, general erythema in 4, macular, resembling measles, 4, pustular 2, herpes 7. This latter was distributed over the back and trunk, and in one instance limited to an arm, later paralyzed.

The clinical picture of the abortive type of the disease corresponded in general with the initial stage of atypical cases followed by paralysis. Mild initial symptoms might be followed by extensive paralysis and, on the other hand, cases with severe and alarming onset have shown slight paralysis and rapid recovery.

In this series there were 222 males and 178 females. The race incidence was as follows: Hebrew, 152; American, 76; Italian, 70; Irish, 50; Polish, 17; German, 6; Colored, 6; Swedish, 4, and Japanese 1. There were a total of 199 under two years of age. Of 537 exposures in the families in which the disease occurred there were 50 secondary cases. Twelve cases had had recent operations on the tonsils, 8 had hypertrophied tonsils and 87 had normal tonsils.

A number of cases were cited illustrating these points and charts were exhibited showing the relation of the onset of paralysis to the day of the disease and the relation of the duration of fever to the day of the disease.

In conclusion, it was stated that the prodromal period has been found to be the most important stage in the course of the disease, both as to early quarantine and treatment. A careful history, while not diagnostic, is very suggestive, particularly in an epidemic.

PERSONAL EXPERIENCE OF THE ABORTIVE AND MENINGITIC TYPES

Dr. Leon Louria said that the most important problem to us as physicians is the diagnosis of this disease in its incipient stage. It is absolutely essential in order to prevent the rapid spread of the disease that all cases be recognized at their very onset.

We must think of this disease as an acute systemic infection, involving, in the main, the cerebrospinal axis. The symptomatology is very frequent, much less than we might expect from the concomitant extent of the cerebrospinal involvement. Extensive areas of perivascular infiltration, engorgement and edema of the membranes and cerebrospinal axis may exist without clinical evidences of their localization. Since degeneration of the nerve tissue is secondary to the acute inflammatory condition, it necessarily follows that the stage of paralysis is preceded by a generalized irritation of the cerebrospinal system. This period of irritation, the preparalytic stage, manifests itself clinically by such symptoms as headache, somnolence, irritability, hyperesthesia, general tenderness, rigidity of the neck, Kernig's sign, Macewen's sign, altered reflexes, and mild muscular weakness. The symptoms of onset of poliomyelitis are those common to other acute infectious diseases, with a predominance of early nasopharyngeal and respiratory symptoms, or gastrointestinal disturbances. Taking these symptoms in turn, we may see how they differ in their characteristics in poliomyelitis and in other diseases.

The fever is moderately high, remittant in type, sudden in onset and yet without rigor. A peculiarity is the drop frequently observed following lumbar puncture. A leukocytosis, running as high as 30,000, is usually present. This is at variance with the statement made by Muller, who found the predominance of a leukopenia, 3,000 to 5,000 white cells, which he considered pathognomonic for poliomyelitis. The leukocytosis associated with a polynucleosis was, in our experience, of no value in making a differential diagnosis.

The pulse is rapid, out of proportion to the temperature, and even in meningitic cases the pulse rate continues high. The respirations are somewhat increased, but never irregular, thus differentiating even the meningitic type of poliomyelitis from tuberculous meningitis.

Gastrointestinal symptoms are marked, vomiting being frequently continuous and persistent and bearing no relation to food, differing in this respect from the vomiting of acute gastroenteritis. Diarrhea is infrequent, while marked constipation is common. The abdomen is frequently distended and children often complain of abdominal pain suggestive of an acute surgical abdomen. Retention of urine and distension of the bladder belong to the early symptoms. This is probably caused by paresis of the abdominal and visceral muscles. This muscular paresis is not a permanent feature and soon disappears. In spite of the fever and apparent progress of the disease, the demands for food in some cases are surprising. In several instances children have been observed attempting to wipe off an imaginary foreign substance from the tongue. This is probably due to a peculiar hyperesthesia of the lingual mucous membrane.

In this epidemic rhinitis has, in the writer's observation, been less frequent than in previously reported epidemics. Pharyngitis, tonsillitis and bronchitis commonly occur. The types of tonsillitis vary widely, but usually are rather mild and not associated with the intense hyperemia commonly found in other throat infections, and were less frequently accompanied by adenitis. The lymph glands in the neck showed pronounced enlargement in but few instances. Recrudescences, or relapses, as Wickman called them, were not uncommon. In some instances continuance of the fever, and the excessive amount of râles suggested an extension of the catarrhal condition to the smaller bronchioles, and the case was then diagnosed as bronchopneumonia. Instead a paralytic condition of the intercostal muscles was present, which prevented the child from expelling the mucus accumulating in the bronchi. The child was drowning in its own secretions, and this was interpreted as pulmonary edema. In such cases the type of respiration is entirely changed, the burden of respiration being borne by the diaphragm, while the accessory muscles were not in action and the abdomen of the child was bulging with every respiration.

The most significant symptoms of the onset of poliomyelitis are those referrable to the cerebrospinal axis. The child lies in apparent stupor, but if aroused is extremely irritable. In the writer's experience profound stupor bordering on coma has been seen only in the severe cases of the encephilitic and meningitic types. Somnolence has been rapidly recognized by the laity as of extreme diagnostic importance, yet the average physician has not yet learned to lay sufficient stress on this symptom.

The general posture and attitude of the child is that of hypotonicity of its musculature, a lack of resistance. An absence of patellar reflex is an early and almost pathognomonic sign, and, similarly, diminution in the tendo Achilles reflex. Skin reflexes remain normal or may be exaggerated, even in a paretic part. A localized weakness may be only of a few days' duration and may attack any single group of muscles. Testing the strength and tonicity of muscles should not be limited to the extremities, but should include muscles of the neck, back and abdominal wall. Paralysis limited to one-half the abdominal wall and interpreted as ventral hernia has been observed by the writer. When poliomyelitis is suspected the child should be made to sit up in bed and then one can tell whether it can hold up its head or not. If the child attempts to stand there is frequently an ataxic gait or the knees give away and the child falls in a heap on the floor. Quite a number of cases have been observed luring the present epidemic in which the paralysis was limited to the spinal muscles. In the vast majority of cases these mild hypotonic and paretic conditions rapidly disappear, leaving no permanent paralysis; these are the cases of the abortive type, or, as Muller calls it, and justly so, the rudimentary type of poliomyelitis. This group of cases far outnumbers the paralytic cases.

Pain in the extremities and areas of hyperesthesia, general or localized, in any part of the body, serve to demonstrate the widespread involvement of the nervous system, the white substance and the posterior nerve roots as well as the anterior horns. Frequently a slight inequality of the two sides of the face exists and is overlooked. Facial paralysis may be the only definite paralysis in evidence, and this may be apparent only when the child is disturbed or made to cry. Other symptoms are a hoarseness in the voice occasionally mistaken for croup; paralysis of the palate and tongue, usually unilateral in the more severe types; weakness of the ocular muscles, producing a temporary strabismus or ptosis, generalized muscular twitchings of the arms, legs or face, observed in several cases in the earliest stage of the disease.

Meningitic types of the disease present considerable difficulty in diagnosis. Macewen's sign should be tested for in every instance. Its presence points to an increased amount of cerebrospinal fluid. A lumbar puncture in this type of cases clinches the diagnosis. The findings in the cerebrospinal fluid in poliomyelitis are definite and pathognomonic. If one would but think of poliomyelitis as an infectious disease attacking predominantly the cerebrospinal nervous system and that the symptoms of poliomyelitis are but the evidences of a pathology, mild or severe, of a greater or lesser portion of this system, one would more readily make the diagnosis.

THE LABORATORY DIAGNOSIS OF POLIOMYELITIS

Dr. Phœbe DuBois stated at the outset that from the laboratory findings alone an absolute diagnosis of poliomyelitis cannot be made during life. Even if a monkey inoculated with the washings from a nose and throat becomes paralyzed, without the history of the case one cannot be sure that he is not dealing with a carrier.

The laboratory is of value in poliomyelitis rather by what it rules out. Of the various procedures that may be undertaken the examination of the spinal fluid is by far the most important.

In the examination of the blood, the count, as a rule, shows a leukocytosis and a polynucleosis, but this is also true of the majority of the infections with which poliomyelitis may be confounded. So far, complement fixation has not been successful; it would be of little value in the paralysis cases because it does not seem that the antibodies could develop before the paralysis in most cases, but it would be of aid in making sure of the abortive cases. The method of determining the presence or absence of antibodies which is at present used is too cumbersome and expensive to be of practical value. A simple method will no doubt be devised, but one cannot foretell whether it will be complement fixation as in syphilis, by agglutination as in typhoid, a skin reaction like the von Pirquet, or by an entirely new method. At the present time the examination of the blood is of little practical value. The examination of the urine is of no diagnostic importance so far as is known.

The examination of the spinal fluid is our real standby. The fluid is clear or slightly hazy, comes out under increased pressure and is increased in amount. Attention has been called of late to the "ground-glass" appearance, especially in the press, as being of diagnostic value in poliomyelitis. Such an appearance is found in the fluids containing the larger number of cells. When the cells are fewer one could not say, from the macroscopic appearance, whether or not they are increased. Furthermore, this appearance is seen in fluids of tuberculous meningitis when a large number of cells are present, in the early purulent meningitides with slight cell reaction, and in normal fluids where there is a small amount of blood present, too small to give any color to the fluid.

A fibrin web frequently forms in poliomyelitis fluid on standing. This was at one time considered diagnostic of tuberculous meningitis.

Microscopically there is an increase of cells, marked, moderate, or slight. The experience of the writer seems to indicate that the number of cells bears no direct relation to the final outcome of the disease. These cells may be mostly polynuclears, or mostly mononuclears, more often the latter. It has been stated that early in the disease there is a preponderance of polymorphonuclears. In the large number of early fluids the writer has found an excess of polynuclears in only a relatively small percentage of cases. Many times cells are so degenerated, even in fresh fluids, that it is difficult to classify them. There are a large number of epitheloid cells that seem to be more numerous and more frequently found in poliomyelitis than in other conditions.

The chemical findings upon which most reliance is to be placed is the prompt reduction of Fehling's solution, a well-marked ring with nitric acid and a positive reaction with Noguchi's globulin test.

The reaction both as regards chemistry and cytology differs greatly in varying cases. In the majority it is well defined and in some few cases very marked. In a small number of cases the findings so nearly approach normal that it is difficult to say whether or not an inflammatory reaction exists.

The chief conditions which have to be differentiated from poliomyelitis on the strength of a clear fluid increased in amount, are tuberculous meningitis, syphilis of the central nervous system, especially acute syphilitic meningitis, and meningism. In a well-established case of tuberculous meningitis, the amount of globulin and albumin is greater than in poliomyelitis; also Fehling's solution reduces slowly or not at all, but more than one-half of the fluids do reduce Fehling's promptly. Finding tubercle bacilli, of course, settles the question, and, failing that, animal inoculation, but this takes four weeks. It would seem that with the history and the examination of the spinal fluid it ought to be easy to distinguish between these two conditions, and ordinarily it is.

In a puzzling case last summer Lange's colloidal gold reaction gave the clue to the diagnosis. In the luetic reaction the change in color is usually the greatest in the third to the fifth tube and never exceeds a fourth. The meningitic reaction has its maximum in the higher dilutions. In general paresis the first three to six tubes become colorless, while in general the maximum reaction in tuberculous meningitis is beyond the middle, while poliomyelitis follows more closely the luetic type, with its maximum before the middle. If there is blood in the fluid it throws out the examination because of the albumin, globulin and cells thus introduced. By meningism is understood a meningeal irritation, functional rather than organic, probably of toxic origin arising in the course of some disease, such as pneumonia, gastroenteritis, or acute infectious diseases and accompanied by an increase of spinal fluid. Ordinarily these fluids show no increase in cells and only the normal trace of globulin and albumin. There are a few exceptions to this, namely, the fluid in prolonged severe convulsions, in severe whooping-cough, and sometimes when a fluid is removed just prior to death.

The faintly cloudy fluid must be differentiated from that found in the spinal fluid of cerebrospinal meningitis caused by pyogenic organisms by exclusion; that is, if the case is one of true meningitis one should be able to demonstrate the organism in smear and culture. It must be borne in mind that meningococci autolyze quickly and are sometimes quite difficult to find, especially if they are scarce or the fluid has stood for twelve hours.

Froin's syndrome is not characteristic of any one disease, but it does occur in poliomyelitis. It consists of a fluid bright yellow in color that coagulates spontaneously. It is due to an old hemorrhage and is so rare that it is mentioned only because it is puzzling if one happens not to have heard of it. True hemorrhagic fluid, that is, where the blood is not due to accidental puncture of a vein, is rare, but it does occur.

After two or three weeks, as a rule, the examination of the spinal fluid in poliomyelitis is of less consequence, the changes are so slight that nothing definite can be said about it. The increase in globulin and albumin usually persist longer than the increase in cells.

In conclusion, emphasis should be placed on the fact that a laboratory diagnosis of poliomyelitis is practically impossible. The clinical study and the laboratory findings must be correlated.

Dr. Herman Schwarz said his experience in the treatment of poliomyelitis in this epidemic included both hospital cases and those in private practice. His observations on the treatment of the disease dealt mostly with treatment by convalescent human blood serum. He had had 21 cases in which he had used the serum early and frequently; of these nine recovered without paralysis. Twenty-one other cases were treated by expectant methods; 17 recovered without paralysis. This seemed to be quite a difference in favor of the cases treated expectantly. As regarded the prognosis in reference to paralysis or non-paralysis, the temperature played no great rôle. If the patient did not die before the third or fourth day a more favorable prognosis might be given. In the bulbar type of the disease, or paralysis of the upper parts of the body, the prognosis was worse than in those having paralysis of the lower extremities. In 9 cases that died the cell count of the spinal fluid was less than 100. A small number of cells was not necessarily a good prognostic sign. The polynuclear count in the cases that terminated fatally was relatively low; in 5 cases it was less than 5 per cent., and in only 1 case was it as high as 21 per cent. In making a prognosis as to paralysis or non-paralysis, one would not be helped by the examination of the spinal fluid. Of 26 cases that were not paralyzed, 9 were treated with serum and 17 without it. In every case there was rigidity of the neck and most of the cases showed Macewen's sign. Of the cases that recovered without paralysis, 10 showed a cell count under 100; a few cases showed a cell count between 100 and 200, hence the cell count did not seem to be a point of much value in the prognosis. It had been stated that when the serum was used the temperature came down within five or six days; cases might also be cited in which no serum was used and yet the temperature came down on the third day. The duration of the temperature did not seem to be affected by the serum treatment. The reaction of the serum on the patient was sometimes *nil* and sometimes the rigidity of the neck was made worse. As to the reaction of the serum on the spinal fluid, it seemed in some instances to increase the indications of an inflammatory process. In certain bulbar cases the use of the serum might be contraindicated. Another difficulty that had been encountered in the use of the serum was that there were so many different kinds of serum and it was difficult to standardize them. One might take any case in which the serum had been used and duplicate it in every particular by a case in which the serum had not been used. Personally, Dr. Schwarz was of the opinion that too much was not to be expected of the serum, though possibly the number of cases he had observed were not sufficient to warrant any very definite statement.

THE PROBLEM OF AFTER-CARE

Dr. Donald Baxter said that while poliomyelitis had always been partially active, it had been overlooked, and it was only since the outbreak of the epidemic that the social conscience had been aroused to the necessity of caring for these cases. To some who watched this epidemic it seemed to have particularly a social and economic import. It had appeared to be more prevalent among the poor. This meant that there were many cripples to be cared for, not only relieved from suffering, but assisted in ways that would enable them to become wage-earners and to take their place as citizens. A committee for the after-care of these children crippled by poliomyelitis had been formed, having among its members surgeons, pediatrists, directors of hospitals, managers of charitable institutions, nurses, and private citizens. It has several purposes in view. It aims to correlate the work of other agencies, so as to avoid the duplication of effort. It keeps accurate records for present and future guidance and is occupied in correcting and confirming data. It makes arrangements for the treatment of cases that are not under the care of a private physician. It is trying to standardize the dispensary treatment of poliomyelitis. Thus far 3,856 cases have been reported upon and 3,267 transferred to the care of other agencies. It is evident, from the investigations of this committee, that the great majority of paralyzed cases are not under skilful care. Many families have retained the family physician at a great sacrifice and in other instances they have been unable to meet this expense. This committee is endeavoring to show these people that hospital and dispensary care is at their service, and it urges them not only to take advantage of the treatment offered, but to persist in it.

Dr. George Draper said that after having listened to such an array of interesting papers several points suggested themselves for further discussion. Dr. Louria made many interesting observations, but he did not lay enough stress on the disease being an acute general infection. Emphasis should be laid on this more than upon any other one feature of the disease. He said that this had been brought to his attention forcibly during the summer. Several men, who came to the city to study the disease and who were active in the work on Long Island, said they had come to study a paralytic disease, and they did not see as much paralysis as they had expected to see. This was because the cases were recognized forty-eight to seventy-two hours before any paralysis appeared, the diagnosis being made by the symptoms and by lumbar puncture. He said that in many of these cases the diagnosis had been definitely established three or four days before paralysis appeared. The interesting signs in the chest described by Dr. Louria as "paralytic râles" should be recognized as such and not mistaken for the râles interpreted as pulmonary edema, that occurred later when respiration was failing. He said that just what the significance of headache was had not been determined. It might be the result of systemic infection or might be due to an invasion of the meninges. Since poliomyelitis belonged to the group of general infectious diseases the headache in the early hours might be part of the general reaction. He stated that Dr. DuBois' paper was based upon much work of the most valuable and enlightening sort. He wished to ask whether the cell counts were made by the wet method or by the centrifuged smear. He said that the method employed had considerable influence on the interpretation of the findings. Pressure under which the spinal fluid was found seemed to have some relationship to the number of cells. When the cell count was high the pressure was low and *vice versa;* there seemed to be a constant relationship here. Exception seemed to have been taken to the making of a prognosis on the findings in the cerebrospinal fluid. But no statement had been made as to the time in the course of the disease when the lumbar puncture was made. This was not a question of days, but of hours. When one saw a child playing about at noontime, and continuing to play until three o'clock, though perhaps not feeling quite well; then at six o'clock the child was very ill and a lumbar puncture was made, which showed 2,500 cells, and the child was dead eighteen hours later, it was significant. It seemed that the information one obtained from an examination of the spinal fluid depended upon the time when it was made. There were other cases in which there was no invasion of the meninges in which one found no cellular increase. It was perfectly possible to say that they had never developed any cell increase, and in some cases there would be a slight increase and then a recession. If the cell counts were correlated with the clinical findings on the day of onset it might be that some significance could be attached to them. The examination of the spinal fluid by the Lange gold test was interesting. A very large number of these examinations were made by workers who knew nothing about the clinical history of the cases from which the specimens came. The work was done independently by the different workers and when the results were brought together they corresponded remarkably well. With reference to the question of treatment, it was doubtful if any positive statements should be made. The public had been much affected by the lack of definite knowledge of the disease on the part of the profession and the ineffective efforts in the direction of treatment. However, he did not know that they had failed; there was a great deal of evidence that would indicate that the serum treatment was very effective, provided it were used early enough. There was also another point with reference to the irritating effect of the serum. It was well known that in the intraspinal treatment of cerebrospinal syphilis, serum containing hemoglobin often caused much more severe reactions than clear serum. During the stress of the epidemic much of the serum was collected and prepared rapidly, and it was possible that some of it might have contained hemoglobin and that this might have been still further irritating to a cerebrospinal tract which was already more or less irritated. This point had been suggested to him by a comparison of cases in which the serum was double centrifuged and those in which serum pipetted directly from the clot was used.

DR. CHARLES GILMORE KERLEY said that considerable had been learned about poliomyelitis during the past summer. It was known that the disease was communicable by human agencies and that the so-called abortive cases were the ones that were the most dangerous from the standpoint of transmission. It was rather peculiar that the very mild cases and the very severe ones were both of the cerebral type. Dr. Louria spoke of the symptom of neck rigidity. Cases in which there was no neck rigidity would show a resistance or a reluctance to bend the body forward and an inability to rest the chin on the chest. In a few cases he found this the only symptom definitely pointing to a poliomyelitis. He considered it a very important sign and a decided aid in the border-line cases. There would also be shown by these children a peculiar awkwardness in attempting to bend or pick up objects from the floor. There was apparently no great amount of pain, but nevertheless there was an involuntary protection against motion in certain directions. During the past epidemic they have learned to look upon sore throat and hoarseness during the hot months as possible premonitory signs, particularly if there was fever and prostration out of proportion to that which was usually expected in an ordinary case of sore throat. He said that he had seen some unusual paralytic manifestations. In 3 children the bladder alone was involved. In 1 case there was paralysis of the third nerve only in a child eighteen months of age. In 2 cases, both of which were fatal, the muscles of deglutition alone were involved. In his patients and those that he had seen in consultation there were no deaths after five days of illness and paralysis did not appear in any case after the seventh day. It did not follow, of course, that this was an established standard, as such observations had not been the experience of all. As to the communicability in a large city like New York, it was impossible to get data of any great value. He had the opportunity during the summer of observing a series of cases that developed in widely separated areas in eastern New York and western Connecticut. He took the trouble to look into the possibilities of exposure in something like 15 cases, the first that occurred in a given community where there had been no poliomyelitis for years. In every instance he was able to demonstrate contact with individuals who had been in association with the disease or who came from infected localities.

Dr. Henry W. Berg said: I have been interested in Dr. Emerson's report that several isolated islands and institutions in the city have been free from this disease, and also in the report that where there were fewest hospital cases there was the highest incidence of infection. That would make it seem that isolation and segregation had materially decreased the extent of the epidemic. This is important, and it would be agreeable to both physicians and health authorities to feel that they had accomplished what they had intended to do by insisting upon the isolation of cases of infantile paralysis.

I wish I had the time to discuss the papers. I feel that it is the privilege and duty of the discussers of a paper, or series of papers, to speak on the subject matter of those papers and no one should take offense if any one who discusses those papers should disagree with him.

I wish to compliment Dr. DuBois, for she has done much actual work in determining the cytology and chemistry of spinal fluids. She has drawn from a vast clinical field and the examination she has made mount up into the thousands. I wonder how many men have counted hundreds of specimens as have Dr. DuBois and Dr. Neal. It is much to her credit that she has been able to avoid all preconceived ideas and in conclusion to make the statement that diagnosis could not be made from the examination of the spinal fluid alone in poliomyelitis. This is an important statement and an honest statement. Clear fluids are present in other diseases and one cannot differentiate them from poliomyelitis by the cytological and chemical examination. This is important from the fact that the danger from the standpoint of the communicability of the disease is in its preparalytic stage and the non-paralytic cases. I believe the disease is mostly communicable in the preparalytic stage, before the paralysis appears, as is measles before the eruption and in the catarrhal stage. When the paralysis appears then the contagious period is passed to a great extent. It therefore follows that the most important stage to diagnosticate is the preparalytic stage, and we should consider whether it can be done positively clinically. There have been some symptoms not taken into account in other years that have been taken as diagnostic of poliomyelitis during the past summer, and when we make a diagnosis on such insufficient data we need as a sheet anchor a report on the cytological and chemical nature of the spinal fluid, if we can put anything distinctive on that fluid. Clinically there is no positive pathogenic sign in the fluids of the preparalytic stage that does not occur in other conditions, and if the cytological examination of the spinal fluid in the early stages only stated that it was a clear fluid, that meant that it did not differ from the fluid in some other conditions in which there is a clear cerebrospinal fluid. When a man tells of a series of 50 cases seen in the preparalytic stage and not one developed paralysis, I can only say I have not seen such an experience duplicated in the early stage of any other infections. When men have observed upwards of 2,000 cases in one epidemic and that a very large proportion of these were real paralytic cases, that is quite a different story. We are not ready to make positive statements concerning the enormous mass of cases to-day, but hope to do so in the future.

DR. LINNÆUS EDFORD LA FÉTRA said: The early diagnosis of poliomyelitis from other meningeal affections and at times even from diseases that do not involve inflammation of the spinal meninges or of the nerves may be exceedingly difficult. In my experience I have come to rely upon two signs—one clinical, and the other laboratory. The most important clinical features of early poliomyelitis are stiffness and tenderness of the neck and back. I have never failed to find this sign in an early stage. Of course the stiffness of the neck is simply a sign of the meningeal involvement and is naturally present in other forms of meningitis. The laboratory test, which is of utmost value, is the examination of the spinal fluid for the number of cells and for the presence of globulin. All of us who have worked at Bellevue Hospital have come to rely upon the finding of more than 10 cells, together with a globulin test, as denoting an abnormal spinal fluid with definite reaction of the meninges to some agent of disease. Of course these findings are present in all of the acute inflammatory forms of meningitis, in tuberculous meningitis and in syphilis of the nervous system. But the combination of a slightly or gradually increased cell count and positive globulin, together with stiffness of the neck, is a very definite evidence of meningitis. Another sign which is very important, but not so constantly present, is Brudzinsky's phenomenon.

In regard to the spinal fluid findings, it must be admitted that there is much yet to be learned, but we know enough already about the spinal fluid findings in normal children, in those suffering from other types of disease, and in those suffering from various forms of meningitis and poliomyelitis, to feel that the positive findings are just as reliable as the positive findings of the thermometer in pneumonia or typhoid fever, and that the negative findings, if the fluid is taken early in the disease, are equally reliable.

In regard to the cell count and the globulin reaction in cases other than proved meningitis or poliomyelitis, the cell counts of spinal fluid were made by Drs. Schloss and Schroeder in preparation for an article which appeared in the American Journal of Children, January, 1916. The normal patients numbered 20, and in these the cells were below 6 and the globulin 0. There were

35 cases of meningitis occurring during the course of otitis media, bronchopneumonia, septicemia, gastroenteritis and malnutrition. Among these the cells were below 6, except in 2 instances. In both of these the meningitis complicated the otitis. In one the cells were 18, with negative globulin. In the other, in addition to the otitis, there was a pneumonia along with meningism. The spinal fluid showed 11 cells with no globulin.

I have just tabulated the spinal fluid findings in 125 cases treated this summer (1916) in Bellevue Hospital, and in only 11 of them was the spinal fluid reported as showing on increase in cells beyond 10 and no globulin. In most of these cases the examination was made late, but some were very rapidly fatal cases. In several cases the first examination showed a large number of polymorphonuclear cells, as many as 3,900 being found in 1 case; this was, therefore, at first mistaken for cerebrospinal. The child subsequently developed facial paralysis and double auditory paralysis. It is interesting to note that after the administration to them of 20 c.c. of Flexner's antimeningococcus serum the patient's polynuclears rose to 4,500—quite contrary to what one would expect in cerebrospinal meningitis. As the technique improved there were fewer discrepancies between the number of cells found and the presence or absence of globulin. Early in our series the spinal fluid was reported as normal in several cases with undoubted paralysis; in the latter part of the series this happened only when the fluid was examined late. Repeated spinal fluid examinations were made in many cases. At times there would be an increase in the number of cells and in globulin on the second or third test, if the case was gotten early; but usually, after the tenth or fifteenth day, the cell count was normal, although the globulin might persist for some days longer. Examples of negative findings in fluid, 3.66; examples of repeated examinations, 77.81, 88.70 and 70.94. The administration of human immune serum usually, but not always, increases the number of cells which become predominatingly polynuclear. The stiffness of the neck, pain in the back, and the Brudzinsky's and Kernig's signs are increased, or even make their first appearance as a result of the reaction to the serum.

As regards prognosis, anyone who has had an extensive experience wth poliomyelitis will be exceedingly cautious about giving a good prognosis before the fourth or fifth day of the disease. No matter how slight the initial paralysis may seem, there is always the danger that the disease will extend to other and more important nuclei. In particular, I think that one should be cautious about giving an absolutely good prognosis in cases of facial paralysis. There seems to be at the present time the feeling that if the facial nerve is involved then all is well. Unfortunately this feeling is not borne out by a careful study of the cases that have proved fatal. If one considers the location of the facial nuclei, he will really wonder how it is why so frequently the cases of facial paralysis do well, inasmuch as it is so short a distance to the nuclei of other important nerves, particularly the glossopharyngeal and the pneumogastric. Unfortunately it has been my lot to see combinations of facial paralysis with paralysis of the larynx or paralysis of the pharynx, which have terminated fatally in almost every instance. When the muscles of the neck are involved, there is also danger that the phrenic nerve may be included in the inflammatory area, and this is always a very serious matter.

In connection with the paralysis of the facial nerve, I have been interested to look over my hospital records to determine what other cranial nerves have been involved in my cases in this epidemic. The olfactory and the optic nerves seem to have escaped, although, of course, it is difficult to know about their function in infants and small children. The third (oculomotor) has been frequently involved, sometimes one portion, sometimes another. I have not seen definitely any involvement of the fourth nerve, that of the superior oblique muscle of the eye. Nor have I known of trifacial involvement. The sixth nerve to the external rectus muscle has been very commonly affected, and the seventh is, as we all know, the usual one that suffers. I have one case of double auditory nerve involvement, which came on definitely on the day before the child came into the hospital. But the glossopharyngeal nerve is not infrequently affected, and occasionally the pneumogastric, shown by either spasm or flexidity of the vocal cords. The spinal accessory nerve is occasionally involved in the paralysis of the neck muscles, and I have seen one case in which the hypoglossal nerve was paralyzed on the right side.

The disease is one of the most serious with which pediatrists have to cope, and in the present state of our knowledge of its prevention and treatment we should be very cautious about giving any prognosis during the first two days.

As to the serum treatment, it would seem that some method of standardizing the serum must be devised before results can be compared and its value determined.

Dr. Louis Fischer said that in poliomyelitis of the bulbar type the prognosis was always bad. One of his cases, a child three years old, could neither speak nor swallow, and became comatose. It had recurring convulsions. A lumbar puncture was made, 15 c.c. of serum injected, and the child recovered. A second case was that of a six-year-old child in a very serious condition. The child was given two injections of serum, two days apart, and recovered without any paralysis. He said that he had seen 7 cases injected with 15 c.c. of serum early in the disease, and all recovered without paralysis. Three cases had respiratory paralysis, all of these died. Some of these cases were mistaken for bronchopneumonia. He stated that he had not seen a single case of respiratory paralysis recover. Some children were very much improved when merely a lumbar puncture was done, the spinal fluid tapped, and the canal washed with normal saline solution. His impression of the serum was that its use should be advised in every case, but it must be used early during the fever, in the preparalytic stage. When paralysis had set in, then, too much must not be expected from the serum. The serum was obtained through Dr. Park and Dr. Zingher. It was marked Serum B and Serum C, but it could not be said which was most efficient.

Dr. Abraham Zingher said that at the Willard Parker Hospital they had decided to try the use of convalescent blood serum in the treatment of poliomyelitis. In order to get donors it was necessary to have recourse to publicity, and also for the purpose of placing the serum within reach of a considerable number of physicians. They had treated about 220 cases at the Willard Parker Hospital and 33 at the Minturn Hospital by serum injections. The action of the serum seemed to be to increase the irritation and to increase the number of white cells. This was the immediate effect. In animals the serum produced a distinct polynuclear leukocytosis and, so far as they had observed, was not specific. He believed, however, that the serum was indicated in the early stages of the disease.

Dr. Henry Heiman said that he regarded poliomyelitis as a communicable disease, not readily communicable, but about as much so as tonsillitis. Anyone susceptible and exposed to tonsillitis might contract the disease; it was about the same with poliomyelitis. Among the first symptoms might be inability to flex the head, as pointed out by Dr. Draper as a pathognomonic sign. This was probably due to an involvement of the posterior meninges alone as distinguished from meningococcus meningitis where the entire meninges might be involved, giving opisthotonus or rigidity of the neck. The meningeal type of poliomyelitis frequently gave pain in the legs and abdomen, which he regarded as head zones due to the involvement of the posterior nerve roots. Dr. Heiman said he wished to put himself on record as observing during this epidemic a characteristic sign which was present in practically all cases of poliomyelitis, especially of the meningeal type. This was a distinct fine tremor of both hands, elicited best by having the hands outstretched and the fingers spread apart. It was present in the early stage of the disease and might persist as long as ten or twelve weeks. It was probably due to an inflammation of the posterior meninges, which extended up into the cerebellar rubral tract. The cerebrospinal system was the target for the virus of poliomyelitis, and consequently there was not a spot from the cortex to the cauda equina that might not be involved.

Dr. Lavinder said he very much envied the men who believed in the communicability of the disease; he had given the basis of his beliefs which showed that he was still somewhat skeptical. He thought that Dr. Draper was right when he said that they had not yet had time to digest the material that had been furnished during the present epidemic and until they did they could not draw conclusions.

Dr. Leon Louria, closing the discussion, emphasized the fact that poliomyelitis was an acute infectious disease and that the medical profession at large was not sufficiently familiar with the abortive types of the disease. He felt that as long as they called the disease poliomyelitis it would imply to the medical mind the presence of paralysis and exclude the non-paralytic cases. We might help to broaden the conception of the disease by changing the nomenclature, for the want of a better name, to "Heine-Medin's disease," a name adopted in Germany and Austria, and also by Dr. Barker in his "Monographic Medicine." In doubtful cases the cytology and chemistry of the cerebrospinal fluid supported the diagnosis, with rare exceptions. Dr. Louria said he could not agree with Dr. Berg that there was nothing distinctive in the symptomatology of early poliomyelitis. He saw a large number of cases, over 350 in the acute stage, and gained the impression that these children had an appearance that differentiated them from other sick children. Just what this appearance was he could not put in exact words, but it was, nevertheless, distinctive. Cases in which the paralysis involved only the facial nerve ran, as a rule, a favorable course, but the prognosis must be guarded while the fever existed. He recalled the case of a boy thirteen years of age, whom he saw about forty-eight hours after the onset, with a right facial paralysis only, and he felt encouraged for a few hours, then the boy rapidly developed a fulminating descending type of the disease, with involvement of the bulb, and death occurred the following day. While drug and serum treatment did not as yet give definite results, he felt that in many instances lumbar puncture brought relief and favorably influenced the course of the disease.

Dr. Herman Schwarz said that this meeting was rather early to come to any very definite conclusions, as the observations on most of the material had not yet been tabulated. In his paper he had merely attempted to give impressions, but thought they would be found to be correct. He felt rather disappointed that Dr. Draper did not give more in reference to his experience with the serum and he would say the same of Dr. La Fétra. The question of the cerebrospinal fluid was very interesting. Whether the question of the value of the findings was one of hours they did not know. If it was a matter of hours it would be difficult to make accurate observations. It had been said that a good prognosis could be drawn from the cell count, but he did not know what method was used. On the whole, it might be taken that the value of the examination of the cerebrospinal fluid to prognosis was still an open question.

Dr. Henry L. K. Shaw, of Albany, said he wished to take this opportunity to tell those present concerning the epidemic in the other half of the State. The cases appeared later than in the City of New York and it was not until July that it seemed worth while to prepare a pin map showing the location of the cases. The first photograph of this map was taken on July 27th, and the cases which came directly from Brooklyn or New York were indicated by a special pin. It would be seen that these cases numbered nearly 50 and were widely distributed throughout the State, although the majority of them were within a radius of fifty miles of New York City. The photographs of this map taken each week showed how the epidemic progressed, and up until yesterday (October 11th) there were 3,569 reported cases of infantile paralysis. The distribution of the cases showed they followed the line of travel.

There had been about 800 deaths from infantile paralysis and a mortality of about 21 per cent. Hudson was one of the first cities to report the cases, and the first case developed in July, but had spent Decoration Day in an infected Brooklyn district. In this city about 38 cases developed, with only 2 deaths, and these cases were practically all in a crowded Italian section of the city. In Saratoga, on the other hand, there were 8 cases occurring in well-to-do families, and, in spite of the best medical attention and nursing, the mortality was 75 per cent. It was difficult to explain the high mortality among certain groups of cases.

DR. SHAW said that he would like to say a word with reference to the plans of the State for the after-care of these cases of infantile paralysis. The State had been fortunate in securing the services of Dr. Robert W. Lovett, of Boston, assisted by Dr. Armitage Whitman, of New York, and Dr. John Hodgen, of Boston. Six nurses had been sent to Boston to learn the methods of massage and muscle training recommended by Dr. Lovett. A series of clinics would be held each day for several months, starting near New York, where the first and greater number of cases appeared.

A record of all the cases was kept in Albany, and a letter was to be sent to the physicians reporting cases in the vicinity where the clinic was to be held, inviting them to bring their patients. Dr. Lovett would make a careful examination of each case and prescribe the treatment indicated, and the child would then be turned over to the family physician. If the family could not afford to pay for the services of a physician, the muscle training and the braces would be provided free of charge, and it was planned that no case in the State would be neglected. The importance of providing these clinics would be seen from the fact that there were only two or three cities where there were any facilities for holding an orthopedic clinic.

Dr. Abraham Zingher said that several months ago several methods had been suggested in the treatment of anterior poliomyelitis and the one method that had given them the most satisfactory results had been the use of serum obtained from immune donors who had had poliomyelitis either recently or from one to several years previously. The serum was administered intraspinally in doses of from 10 to 15 c.c. and repeated every twenty to twenty-four hours until two or three doses were injected. To obtain as large a supply of serum as possible, and make it available to the members of the medical profession in this and adjoining states, they had to have recourse to a certain amount of publicity. They themselves had the opportunity of using serum in 160 cases at the Willard Parker Hospital, and in 33 cases at the Minturn Hospital. In addition, the serum was supplied for 225 cases in the private practice of a number of physicians. The serum injected intraspinally in the acute stages of poliomyelitis produced a moderate polynuclear leukocytosis, which was increased in intensity by the presence of hemoglobin and tricresol, which was added as a preservative. This cellular reaction was not specific, since similar reactions were obtained with normal human serum, the secondary albumoses of Jobling, and, to a less extent, with horse serum. It was probable that the phagocytic action of the leukocytes was enhanced by the presence of specific antibodies in the immune serum. If some of the recent work of Rosenow's was verified and the disease was found to be caused by the invasion of the attenuated streptococcus producing most probably the lesions of an embolic type, then their conceptions of the pathology and treatment of the disease would have to be changed. They did know, however, that one of the chief weapons of the body against the streptococcus was the phagocytic action of the polynuclear leukocytes.

The effect of the immune serum seemed to be fairly shown by the 33 cases treated in the Minturn Hospital. These cases were carefully observed and received the full treatment. Of the 33 cases, 14 were in the preparalytic stage of the disease at the time the serum was administered; of the 14, 8 remained free from paralysis, 2 developed paralysis within twelve to eighteen hours after the first dose of the serum, and 4 developed paralysis forty-eight hours or more after the injection of the serum. Of these 4, 2 patients showed an involvement of the extremities, 1 of the right side of the face, and 1 an external rectus of one eye.

The rapid and decided subsequent improvement in these cases was noticeable. None of the cases treated in the preparalytic stage of the disease died. Of the 19 cases treated with serum after paralysis had set in, 3 died soon after the injection (within twenty-four hours) and 16 recovered with varying degrees of motor impairment.

Pseudo-reaction on the Skin, with Special Reference to the Schick Toxin Test—J. A. Kolmer and E. L. Moshage (Jour. A.M.A., 1915, Vol. LXV., p. 144) state that in conducting the Schick toxin test for immunity to diphtheria, it would appear advisable to use as highly potent toxin as possible and to inject one-fiftieth or one-fortieth the minimal lethal dose so diluted with normal salt solution as to be contained in 0.05 or 0.1 c.c. The percentage of tricresol present should not be more than 0.25 per cent. In this manner the protein constituents of the toxin bouillon are reduced to a minimum, owing to high dilution, and trauma of the epidermis is correspondingly reduced. When time permits, it is better to read the reactions after forty-eight than after twenty-four hours, although in the presence of exposure to diphtheria it may be advisable and necessary to inspect the reactions and immunize non-immune or positively reacting persons at the end of twenty-four hours. The use of a control fluid composed of a bouillon diluted 1:10 or 1:100 and injected in the same amount as the toxin will aid in the detection of skin hypersensitiveness and pseudo-reactions, and this is especially indicated when persons suffering with scarlet fever and measles are being tested. Otherwise the use of the control fluid is not absolutely necessary, although in the routine employment of the Schick test without a control injection, a small percentage of persons may be regarded after twenty-four hours as reacting positively on account of mistaking a pseudo-reaction for a true toxin reaction. Very small areas of erythema about the site of injection measuring, for example, about 2 or 3 millimeters in the largest diameter, may safely be regarded as purely traumatic reactions; but with larger areas one is generally unable to differentiate at the end of twenty-four hours between the true and the false reaction, and for the purpose of caution should usually regard them as toxin reactions and administer antitoxin. Even under these conditions the use of the Schick test will obviate the necessity of giving antitoxin to about 40 or 50 per cent. of persons.—*American Journal of Obstetrics*,

DEPARTMENT OF ABSTRACTS

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Phillips, Wendell C.: Chronic Purulent Otitis Media, with Special Reference to Tuberculosis. (Annals of Otology, Rhinology and Laryngology, December, 1915.)

The former opinion that tuberculosis of the middle ear was a rare condition must be modified in the light of recent investigation. The author states that primary tuberculosis of the soft tissues, ossicles and bony walls of the middle ear is the determining factor in a large proportion of all otorrheas, especially in young children. Bilateral lesions and multiple perforations of the drum are apt to be tuberculous in character. In a series of forty-four patients the pus from the middle ear or mastoid was found to contain tubercle bacilli in 13.6 per cent. The method of obtaining positive results is complicated and is described in some detail in the original article, and out of the 12 cases reported in which tubercle bacilli were demonstrated, 8 were infants and small children. S. W. T.

Hutchison, Robert: Fainting Attacks in Children. (British Journal of Children's Diseases, June, 1916, p. 161.)

There are 3 case reports—girl, four and one-half years; boy, eight years, and girl, five and one-half years—brought in with a history of fainting attacks, which are usually attributed by the parents to "heart weakness," who are much alarmed in consequence. There is nothing to indicate anything definitely abnormal in the examination of the heart in any instance. Consciousness is not lost and the duration is much longer than of a minor epilepsy. He regards the condition as primarily nervous in origin, with vaso dilatation of the splanchnic area and inhibition of the heart. Removal from school, seaside air and attention to digestive organs speedily results in a disappearance of the attacks. J. B. M.

ROCHE, C.: OPHTHALMIA NEONATORUM TREATED WITH VACCINE. (Ann. de Medec. et Chir., T. XVIII., No. 11.)

A very severe case of ophthalmia in a newborn infant was treated with full doses of gonococcic vaccine prepared by Nicolle and Blaizot with excellent results. Other cases treated previously by Cuenod and Penel and one by Offret were equally successful. It is considered necessary, however, to supplement the treatment with local applications. C. D. M.

NORTH, CHARLES E.: SAFEGUARDING THE HOSPITAL'S MILK SUPPLY. (The Modern Hospital, July, 1916, p. 13.)

This article is a plea for the pasteurization of milk. The author states that New York City has for the past three years carried out a gigantic experiment in infant feeding at its fifty-one municipal milk depots, where an average of 17,000 babies have been fed pasteurized milk without any sign of rickets or scurvy. This statement is interesting when considered in the light of the bulletin of the New York Health Department of April 29th regarding infantile scurvy and pasteurized milk.

"Clean milk" should be the hospital slogan. Cleanliness contributes most to decency, and, although milk may be safe because it has been boiled, it may be indecent because it is filthy. A clean dairyman can produce clean milk anywhere by the use of a milking pail with a hooded mouth 5 inches in diameter, the plane of the opening being at an angle of 45 degrees with the horizon. The use of this type of pail to keep out dirt, plenty of boiling water to keep pails and cans sterile and a tank of ice-water to keep the milk cold—these three things alone will produce wonderfully clean milk on any farm.

All milk before being pasteurized should be clean and the removal of all filth is best accomplished by clarification. Clarification means centrifugally cleansing milk of the udder waste and foreign and impure matter it may contain, without affecting its butter fat or other normal constituents. Most market milk is contaminated with particles of dust, dirt, hay, cow feed, cow bedding, cow mature, hairs, dandruff, insects, etc. Some of these float on the surface and others settle to the bottom as sediment.

Udder waste and blood, pus and bacteria from udder inflammations, together with most of the foreign dirt, are readily thrown out by the application of centrifugal force and come out as a dark, blood-streaked, slimy mass known as "clarifier slime."

Five reasons are given as to why all milk should be pasteurized: First, raw milk causes a large percentage of infant deaths from intestinal disease; second, septic sore throat; third, typhoid fever; fourth, tuberculosis; fifth, scarlet fever and diphtheria. The author dismisses the old objection that pasteurized milk is only a substitute for cleanliness by urging that all milk should be decently clean before pasteurization.

It is granted that certified milk is ideal in the matter of cleanliness and decency, but the writer argues that in the matter of safety, certified milk cannot furnish a guarantee. Not only has bovine tuberculosis constantly been found present in the dairy cows of certified herds to some extent, but occasionally it has been found to a very large extent. It has been even more difficult to keep dairy cows free from udder disease, and sore udders are dangerous to the milk consumer as the cause of septic sore throat.

In selecting milk, safety, decency and price are the three matters of chief importance. Safety is the most important, and if a perfect milk scores 100 points, it would be fair to allow 50 points for safety, and 25 points each for decency and price. These degrees of safety, decency and price may be tabulated as follows:

Milk	Safety Points	Bacteria in Raw Material	Decency Points	Price	Price Points
Pasteurized in bottles ...	50	10,000	25	9c.	25
Pasteurized in bulk and bottled	45	100,000	20	10c.	20
		200,000	19	11c.	15
Medical					
Veterinary inspection ...	30	500,000	10	12c.	10
Sanitary					
Scoring farms	25	1,000,000	5	15c.	5
No inspection	0	1,000,000 plus	0	20c.	0

Proper clarification would add 5 points to the decency of all milk, and in the case of raw milk would also add 5 points for safety.

By combining the points the following table is obtained:

Milk	Safety Score (perfect, 50)	Decency Score (perfect, 25)	Price Score (perfect, 25)	Total Score
Grade A				
Pasteurized in bottles ...	50	19	20	89
Pasteurized in bulk and bottled	45	19	20	84
Grade B				
Pasteurized in bottles ...	50	5	25	80
Pasteurized in bulk and bottled	45	5	25	75
Grade C				
Pasteurized in bulk and canned	45	0	25	70
Certified (raw)	30	25	5	60
Ordinary raw milk	0	0	25	25

From this table it appears that Grade A pasteurized milk scores 89 points and has the highest public value of all milks. This is because its safety is guaranteed by pasteurization, it is decently clean, and can be sold at a moderate price.

Every city should control its milk supply just as it supervises the purity of its water supply. Municipal milk control may be effected by the installation of a milk laboratory, pasteurization, bottling the milk and by the establishment of definite grades and standards for milk. R. B. M.

MYERS, HARRY L.: A CASE OF RIGHT ABDUCENS PARALYSIS FOLLOWING ACUTE MASTOIDITIS. GRADENIGO'S SYNDROME. (Annals of Otology, Rhinology and Laryngology, December, 1915, p. 800.)

Gradenigo's syndrome is described as consisting of purulent otitic discharge, abducens paralysis, neuralgia, and pain over the frontal and parietal regions.

On October 7th the author was called to see a girl of eight years suffering with acute catarrhal otitis media on the right side. She had had two or three attacks of earache at about one-year intervals. The drum had never ruptured and the attacks had subsided in about four days. Though the adenoids and tonsils were large, the child had had no difficulty in breathing. The earache subsided and two weeks after she was first seen the adenoids and tonsils were removed. The patient left the hospital the next day, but returned that evening with a temperature of 102° and pain and bulging in the right ear. The drum was incised and free discharge began. As pain and tenderness developed over the mastoid region, this was operated upon on October 28th; no free pus was found; the dura was exposed over a part of the sinus, which appeared healthy. For five days the patient made rapid improvement, but on the night of November 4th she became very restless and complained of great pain over the right eye. The mastoid wound showed no signs of infection and the temperature was 100°. Two grains of asperin controlled the pain. On the 7th she had a return of the supraorbital pain, but she improved so much after that that she was allowed to go home on the 9th. She was seen every day and showed signs of suffering from the neuralgia and on the 26th of November complete paralysis of the external rectus of the right eye was discovered. She was readmitted to the hospital and a complete neurologic examination made. This was negative, with the exception of the abducens paralysis and the neuralgic affection of the fifth nerve. Under treatment with aspirin, urotropin and codia, supplemented with syrupus ferri iodidum, she gradually improved and was allowed to go home on November 27th. At the time of the report, the paralysis has almost disappeared and the child is rosy and well. The etiology of acute paralysis of the ocular muscles may be either intoxication, infection or traumatism. There was no evidence of herpes. Traumatism in this case may be ruled out, as no force was used, the bone being soft. Gradenigo's conclusion is that from some cause a circumscribed leptomeningitis is produced at the tip of the petrous bone.

S. W. T.

GRAHAM, H. B.: TUBERCULOSIS OF THE MIDDLE EAR. (Annals of Otology, Rhinology and Laryngology, March, 1916, p. 105.)

Nine cases of tuberculosis of the middle ear are presented in this article, 6 of them being in small children. It is believed that such a well-defined clinical picture is given in these cases that the aurist should be able to make his diagnosis based on the following points: (1) Clinical histories and examinations, (2) pathological sections, (3) presence of tubercle bacilli in the secretions, and (4) animal inoculations. The most probable source of infection of the middle ear is through the Eustachian tube. Bovine bacilli may be present in the milk of nursing infants, but is not considered a very probable cause. The necrosis of bone produces facial paralysis more often than do the simple infections.

CASE 1. At sixty-four days of age presented swollen cervical glands, pressure upon which caused a discharge of pus from the external auditory canal; this pus showed tubercle bacilli. The child developed facial paralysis on the sixty-eighth day and died five days later of acute general tuberculosis. The child had been fed on a milk formula and probably had a bovine infection through the Eustachian tube.

CASE 2. Infant, two and one-half months old, with a bilateral aural discharge. A radical mastoid operation showed tuberculosis of the tissue removed. The walls of the promontory and semicircular canals were eroded, especially on the right side.

CASE 3. Child of five months, breast-fed for six weeks; cow's milk for two months, then condensed milk. At two months there was persistent vomiting and at three months aural discharge was noticed. At this time the child complained of pain, but with the cessation of discharge this also stopped, but two months later the cervical glands began to enlarge. A pale tumor was seen in the aural canal and a radical mastoid operation revealed a tuberculoma of the middle ear and mastoid. Two years later the child was apparently perfectly well.

CASE 4. Child, nine months old, which had had a discharging ear for four months, but no pain at any time. Some swelling developed behind the ear and a mastoid operation revealed a caseous mass. Granulations from this were inoculated in a guinea-pig and produced a marked general tuberculosis. The child died two weeks after the operation with meningeal involvement.

CASE V. Child of one year, which developed cervical adenitis at four months and at that time an aural discharge was noticed. The ear was found to be filled with a polypoid mass and pus. A radical mastoid operation was done and a large sequestrum removed. On microscopic examination of this piece of bone, tubercles were demonstrated. The child recovered entirely.

CASE 6. Child of seven, who had had an aural discharge for two years with no pain. The general symptoms were those of tuberculosis and the aural lesion was thought to be of the same character, though not positively demonstrated. S. W. T.

BOOK REVIEW

The Diseases of Infancy and Childhood: For the Use of Students and Practitioners of Medicine. By L. Emmett Holt, M.D., ScD., LL.D., Professor of Diseases of Children in the College of Physicians and Surgeons (Columbia University), New York, and John Howland, A.M., M.D., Professor of Pediatrics in the Johns Hopkins University, Baltimore. 7th edition, fully revised, 215 illustrations. New York and London: D. Appleton & Co. 1916.

The authors of this book have achieved success in the well nigh impossible task of making a new edition of an old work seem as fresh as a newly written volume. The impression of up-to-dateness is one of the first which greets the reader of this standard text-book on pediatrics in English. To this, undoubtedly, the trim appearance of the book, due to new plates of very readable type, contributes; but a close study reveals the fact that a most scrupulous care has been exercised in condensing, adding and discarding material. In certain of the earlier chapters the result has been to make almost every word of essential significance.

There are a number of newly written sections and rewritten chapters, the results of the work of the past five years in pediatrics being incorporated without increase in bulk. Particularly are the chapters on Nutrition, including that on infant feeding to be commended. In no previous edition of the work, nor in any other work on pediatrics, is the subject more clearly or comprehensively treated. The arrangement is logical, and the reader may acquire the principles upon which successful infant feeding is based without too close a subservience to the authors' personal practice, so that he may feed his patients with intelligence and not simply by borrowed formulas. Convenient tables of caloric and other values are given; and careful directions for making up food and feeding it, details too often overlooked. In the later chapters, many excellently illustrative temperature charts render an appreciation of the infectious diseases easier to attain.

There are some features of the pediatric progress of the last few years which have not yet found a place in the book as is to be expected in a work to be used largely as a text-book for the undergraduate medical student; and in spite of its appearance of freshness the work shows on every page that it is authoritative and conservative, the result of an evolution, which could only be brought about by unremitting consideration and revision.

ARCHIVES OF PEDIATRICS

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ORIGINAL COMMUNICATIONS

PERTUSSIS *

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Chicago, Ill.

Whooping-cough may be defined as a contagious disease, characterized by paroxysmal coughing attacks. It may occur in epidemic as well as in sporadic form. The contagion is communicated from one human being to another. It is preëminently a disease of childhood. The predisposition to the disease is general, and it is observed from earliest childhood until the later years of life. Having once suffered from the disease, the individual is rendered immune to future attack.

Historical—It is doubtful whether Hippocrates recognized whooping-cough as a disease entity. Certainly no epidemic is described in his writings. Other writers, as Celsus, Plinius, and Avasenna—the Byzantine, the Roman, and the Arab physicians—knew nothing of whooping-cough. Indefinite descriptions of communicable cough are contained in the literature, though no clear account of the epidemic occurrence of whooping-cough was given until 1578.

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The first authentic epidemic was described by Guillaume de Baillou. It occurred in Paris. The epidemic nature of whooping-cough cannot be recognized from the descriptions which are contained in the early writings. A severe epidemic of whooping-cough occurred in London in 1658. Previous to this time it was endemic in London and occurred only occasionally as a prevalent disease. Since the middle of the seventeenth century numerous epidemics have been described. Sydenham recorded one in 1670 and another in 1679. In the year 1695 many children died from the disease in Paris and in Rome. In 1726 a dissertation on whooping-cough was published by Platz in Holland. In 1730 Friedrich Hoffman contributed a very complete account. Some time after this an epidemic occurred which prevailed not only in Europe, but also in South America. A severe epidemic occurred in Germany in 1815 and 1816.

Boerhaave has not described whooping-cough in any of his writings. On the other hand, de Haen in his lectures describes very accurately the epidemics which occurred in The Hague in 1746 and 1747. There was a severe outbreak in Tübingen in 1749, described by von Sauvages. An epidemic from 1749 to 1764 in Sweden was described by the famous teacher, Rosen v. Rosenstein. Since that time other epidemics of less severity have occurred and have been described and recorded.

In the nineteenth century, in civilized countries it appears that the epidemics are less widespread and that the disease tends to occur more endemically than was formerly the case. The severe, fatal and widespread epidemics, for the present at least, seem to have practically disappeared.

Epidemiology—Whooping-cough occurs in epidemic form. The outbreak may be limited, that is, it may be confined to one house, or it may occur on a certain street, or it may be diffused over a wide territory. Indeed, according to the historical report, the disease has occurred as a pandemic. The disease is particularly contagious for children. Those of the second year are most predisposed. Children of the third and fourth years are also predisposed to the disease, but after the fifth year it tends to become less frequent. During the first year of life the disease is not uncommon; indeed, it may be observed in infancy. I have myself observed a case in an infant less than one week old. An older child in the family fell ill with the disease during the last months of the mother's pregnancy. The mother herself acquired the disease, and the infant, as stated, showed symptoms during the first days of life. Any one who has not seen a case of whooping-cough in a newly-born infant can scarcely imagine the symptoms which it produces. The baby gives a few explosive coughs, becomes intensely cyanotic, seems to wilt, and appears lifeless. This baby, after a very severe illness, recovered. These cases are occasionally recounted in literature.

Cockayne contributes a paper on the subject of pertussis of the newly born. (British Journal of Children's Diseases, Vol. X.) He concludes that the symptoms which appear in the infant during the first days of life depend on an infection from the mother, and he assumes, without offering proof, that the bacillus must be present in the blood. It must be remembered in connection with these cases that the correct diagnosis may be overlooked in view of the fact that the baby does not whoop, and that the paroxysm is atypical. There is usually some bronchitis present, however, and the condition resembles in many respects attacks of pulmonary atelectasis in young infants.

Paul Luttinger (American Journal Diseases of Children, September, 1916) summarizes the age incidence of the disease, based upon an analysis of 10,000 cases, as follows: About 80 per cent. of all cases and 97 per cent. of all deaths are in children under five years of age; 50 per cent. are in those under two years of age, and over 50 per cent. of all deaths are in children under one year of age.

Older children and adults show considerable immunity to the disease. According to many observers, girls are more frequently attacked than boys. In order to explain this belief, it has been suggested that the larynx of the female child is congenitally narrower than that of the male, and for this reason more easily and more severely attacked. It follows, then, that the prognosis should be less favorable in girls than in boys for the same reason. Luttinger, in his recent publication, says that no matter what group of figures are examined, one is struck with the high morbidity and mortality incidence among girls.

While adults are rarely attacked, women are more susceptible than men. This is particularly true of pregnant women. As a general thing the attacks are less typical and of less severity in adults than children. The disease does occasionally occur in very old people. Apparently certain families show a more marked predisposition than others.

It is frequently stated that the disease occurs most often toward the end of winter and in the early spring. I believe, however, that at the present writing no general rule can be given for the seasonal occurrence of the disease. There is no doubt that the period of prevalence varies in different localities. Paul Luttinger's findings on seasonal occurrence are very interesting in this connection. He found that of 6,868 cases reported during 1915 the disease became more frequent in May, the number increasing in June and July, reaching the highest point in August, diminishing slightly during the autumn and falling in December. He is convinced that most cases occur during the spring and summer.

The 6,768 pertussis cases reported during the year 1915 were distributed as follows:

Month	Cases Reported	New Cases at Clinic	Deaths
January	341	140	14
February	381	65	16
March	452	91	16
April	462	112	42
May	754	114	43
June	599	231	34
July	843	253	40
August	906	348	51
September	640	295	55
October	543	181	39
November	458	173	15
December	389	157	20
Total	6,768	2,160	385

One would expect *a priori* that the disease would be less severe in the summer time, when the patient can practically live outdoors, though Luttinger's figures show that the death rate is high in July, August and September. It is said that the disease runs a milder course in warm than in cold climates. It is less frequent in some years than in others. There are times in every large center when there are only a few cases. This may be due to the fact that large numbers of children may be immunized one season by being infected with the disease, and that for one or two seasons thereafter there are relatively few who are susceptible.

So far as the communicability is concerned, it is the concensus of opinion that the malady is passed from one individual to another by the microörganisms contained in small particles of sputum, expelled during the act of coughing. These particles become lodged in the respiratory tract of another child, and cause another infection.

The indirect method of infection through dried sputum, dust, clothing or toys seems to be of rare occurrence.

Etiology—It must be acknowledged that there is not yet universal agreement concerning the etiology. No one can doubt that the disease is infectious and that the upper respiratory tract is the focus of localization. Everyone who has any acquaintance whatever with the disease knows that it may be conveyed from one person to another, that it occurs in epidemic form, and that it may appear in places where it never existed before. As a rule, a new invasion of this kind may be traced to some imported case.

It may be stated as a general proposition that the disease is conveyed by human carriers. Adults who suffer from atypical attacks of the disease are carriers and undoubtedly contribute to its spread. Whooping-cough is considered to be very contagious. On the other hand, every physician of experience will confirm the observation that some individuals who are exposed and who have not previously had the disease nevertheless remain immune.

Luttinger finds that moving-picture shows are centers for the spread of infection, and that public conveyances, schools, nurseries and recreation places are likewise a menace. He found in his clinical studies that whooping-cough is transmitted by direct contact in about 60 per cent. of the cases. The infection is usually carried by a neighbor.

A factor in the widespread infection of the disease is the persistence of the coughing process. For this reason the infectiousness continues for a long time. The frequency of coughing probably bears some relation to the spread of the disease. The oftener the patient coughs, the more infectious material is expelled, and consequently more chances are present for infecting others.

How long does whooping-cough in children remain infectious? How long may a child ill with the disease remain a carrier? Clinical observations lead to the conclusion that the disease is most readily conveyed during the catarrhal stage, and in the beginning of the paroxysmal period, and that from this time on the infectiousness of a given case diminishes, though we have no evidence to disprove the possibility that the disease may be communicated to others as long as the patient coughs. Health boards and sanitarians have decided that a child may be readmitted to school forty-two days after the paroxysmal attack has ceased, or about three weeks after the cough has disappeared.

There are those who seriously believe that the nervous constitution of the child is a predisposing factor in causing the disease. The thought, however, that the disease is a pure neurosis is untenable and requires no further elucidation. It is interesting as well as important to state both sides of a case, and it must be acknowledged that there are still those high in authority who are not absolutely ready to accept the Bordet-Gengou bacillus as the proved and specific cause. Czerny is not keen to accept a single microörganism as the specific pathogenic agent. He thinks that any one of several microörganisms may produce paroxysmal attacks indistinguishable from, or identical with, pertussis provided that an increased nervous irritability preëxists on the part of the child. He does not deny the specificity of the Bordet-Gengou bacillus, though he thinks additional evidence must be adduced to prove it the sole etiological factor. He would consider the etiology of pertussis in the same light as that of pneumonia; it might be caused by a variety of microörganisms. This is tantamount to saying that if the neuropathic constitution of the child is eliminated, and if the same infection takes place, a respiratory catarrh will result, but not a whooping-cough.

Jochmann also thinks that a nervous factor may play a part in whooping-cough. The opinion of Jochmann may be quoted in this connection: He is not convinced that the Bordet-Gengou bacillus is the specific organism. He does not consider that animal inoculation experiments are conclusive and he is unwilling to be convinced by the agglutination and complement-fixation tests. He says that one should be cautious in accepting serological evidence exclusively in identifying a microörganism. Agglutination and complement-fixation tests, he says, indicate that a reciprocal action exists between the bacillus and the host without yielding any positive knowledge as to the specific cause of the disease. He reminds us that the streptococci found in scarlet fever can be agglutinated by the serum of scarlet fever patients. He concedes that streptococci produce secondary infections in scarlet fever, though he insists that few if any bacteriologists would maintain that streptococci are the specific cause of scarlet fever. Jochmann concludes that the Bordet-Gengou bacillus reaction is not in entire conformity with the postulates of Koch.

Bordet and Gengou, in 1906, isolated on potato-glycerin and blood agar a short bacillus which previously had not been recognized. This organism is obtained from the sputum of whooping-cough patients during the catarrhal period, or during the first week of the spasmodic stage. Later on in the disease it is difficult or impossible to obtain the organism, and this is thought to be due to the fact that other saprophytic germs, particularly the influenza bacilli, overgrow the Bordet-Gengou bacillus. This bacillus is a small rod with round ends, stains well with the ordinary analine dyes, though the best results are obtained with carbol-methyl blue, or with carbol-toluidin blue. The periphery and the ends seem to stain more sharply, taking on the character of polar staining. The organism is immobile, aerobic, and stains negatively with the gram stain. When the culture material is inoculated colonies are scarcely visible, though after several generations a whitish coating is noted on the culture material.

Symptomatology—The following stages of the disease are described: First, the period of incubation. This lasts from three to eight days. This stage is without symptoms. Second, the catarrhal stage. This is characterized by the symptoms which resemble those of a severe cold. The patient suffers from rhinitis, sneezing, headache and conjunctivitis, and excessive secretion from the eyes. Cough occurs during this stage, though it has none of the characteristics of pertussis. Fever is very common during this stage. It may be mild, remittent, or intermittent. The catarrhal stage lasts from three to fourteen days. In cases of severe epidemics this stage may be shorter. The general condition of the patient is not much disturbed during this stage as a rule. The appetite is good, the digestion usually normal. In the severer cases, however, the patients complain of fatigue, headache and loss of appetite during the catarrhal stage. The cough continues about the same throughout the entire stage, and does not differ from that of an ordinary bronchial catarrh. If the disease is of the severe type fever sets in with the catarrhal stage. Catarrhal symptoms are more severe. The patient complains of photophobia and difficulty in swallowing. In the severer type of the disease he early complains of an irritative cough due to laryngitis and tracheitis. Other symptoms, such as headache, languor, loss of appetite and frequent sneezing, become more marked. As this stage draws to a close the cough begins to take on a more paroxysmal character. Children become quieter, they avoid active movement because they very soon learn that activity produces more frequent and more severe coughing spells.

The characteristic period of whooping-cough is the paroxysmal stage. As one would expect, a sharp line of demarcation between the catarrhal and the paroxysmal stage cannot always be drawn. At the height of the disease in a typical case the cough is so characteristic that it cannot be mistaken. Fever, as a rule, is not present during this stage. Between the attacks the children appear to be perfectly well. In mild cases this stage lasts from four to six weeks, in severe ones from two to three months. It may last six months. A single attack may be described as follows:

The patient feels perfectly well, he is playing quietly and is unconcerned. Suddenly he ceases to play, his face becomes pale, he holds his breath, very frequently he attempts to cry. Adults in the same condition complain of a tickling in the throat and of the pharynx and larynx and sometimes experience a feeling of pressure or heaviness over the thorax. Sometimes they complain of dizziness. Very often they experience a sense of choking accompanied by a feeling of anxiety. These premonitory symptoms last only a few minutes. The paroxysm begins with a sharp, loud, inspiratory sound, which may be singing or whistling in character. This is followed by a number of expiratory coughs, possibly five or ten. These may repeat themselves several times, to be followed by a more or less respiratory difficulty, and the expectoration of tenacious white mucus. Very often vomiting of food and mucus occurs. Frequently the patients are cyanotic during these attacks. The face and neck are particularly blue. The veins of the neck become prominent, the larynx is raised, the muscles of the neck are contracted, the muscles of the upper part of the body and of the extremities may show spasmodic movements. Urine and feces are sometimes passed involuntarily. Blood may appear from mouth and nose, older children usually run to a chair, or to mother or nurse to seek support.

After the attack is over the children usually lie down prostrated. Frequently they perspire profusely, though in a brief time the paroxysm is over, their misery is forgotten and they resume their play as though nothing had happened.

An attack may be produced by irritating the pharynx with a tongue depressor, or the larynx may be irritated in swallowing food. Attacks are more common during the night and early morning. Patients are frequently awakened from their sleep by the cough. Older children often refuse to go to bed, because they have found that the cough is increased while they are in the recumbent position or during sleep. Very often the paroxysm is ushered in by repeated sneezing. Some authors refer to this as spasmodic sneezing.

If the disease lasts a considerable time the patient becomes emaciated. This is due to the loss of sleep and the repeated vomiting attacks and the resulting inanition.

As the paroxysmal stage draws to an end the attacks gradually become less severe and less frequent. Patients begin to gain in weight and little by little recovery occurs. The reports during the last two decades indicate that the disease lasts from six to ten weeks. The older writers recorded epidemics which were more sharply acute in which the disease ran a short and severe course, and not infrequently terminated fatally.

It is interesting to note that the disease varies in course and intensity in different children of the same family. One child may have a most severe attack, while a brother or a sister may have the disease in such a mild form that its nature would not be indicated save for the familial situation. It is certain that abortive cases occur. It is an old and well recognized fact that the peculiar characteristics of the disease are lost when complications occur. This is notably true in cases in which pneumonia and diphtheria occur as complications. The attacks are more frequent when the patient eats or drinks rapidly. Paroxysms are also produced if the patient overdistends his stomach. Rapid bodily movements, laughing, crying, sneezing, irritation of the skin, tickling the mucous membrane of the pharynx and emotional excitement of any kind increases the tendency to cough.

It cannot be denied that at times a degree of imitation tends to produce cough. It is frequently observed in hospitals where a number of children are sick with the disease that if one of these commences to cough all of the rest join in the chorus. A change of climate sometimes diminishes the cough, and an improvement in weather conditions sometimes ameliorates the frequency and severity of the paroxysms.

In rare instances the urine has contained sugar and an increase of uric acid. A moderate albuminuria may be present, which disappears with recovery. Hematuria may occur, though it must be looked upon as a hemorrhagic condition similar to that which is produced in other parts of the body, due undoubtedly to the rupture of small vessels brought about by the severity of the cough. An acute nephritis may develop after whooping-cough, though it must be considered rare.

Complications—Complications require only brief mention. The most frequent of these are diffuse bronchitis and catarrhal processes in the mucous membrane of the trachea and larynx. Many children die from the extension of the bronchitis to the minute bronchi. The most feared complication is pneumonia. As has already been said, when the pneumonia becomes well developed the typical characteristics of the whooping-cough disappear to reappear when the pneumonia has resolved. It may be mentioned in passing that whooping-cough pneumonia is particularly fatal in children who are at the same time suffering from rickets. Bronchiectasis and pulmonary fibrosis result from peribronchial tissue changes. Emphysema may be a temporary condition and disappear as recovery from the disease takes place, or it may remain as a permanent condition. When severe paroxysms occur interlobular or subpleural emphysema may occur. Emphysema of the skin has been reported. This has been known to involve the entire body. Pneumothorax has been occasionally described. Hemoptysis is one of the rare complications.

The relation of whooping-cough to tuberculosis need not be referred to at length. Pulmonary tuberculosis is not an infrequent sequel; tuberculous adenitis, particularly of the bronchial glands, is a common complication; and acute miliary tuberculosis sometimes terminates the course of the whooping-cough prematurely.

The nervous system presents numerous complications. Convulsions in this disease have attracted the attention of physicians for a long time. These may be due to simple hyperemia, or edema of the brain. Brain hemorrhages are not infrequently observed. As a result hemiplegia, asphasia and hemianopsia and convulsions may occur.

Encephalitis with convulsions and fever is not infrequent, and hemorrhage into the spinal cord, with ascending paralysis of the Landry type, receives frequent mention in the literature. Psychic disturbances, such as complete dementia, have been observed.

The heart frequently shows an arythmia. On microscopic examination the heart muscles show fatty degeneration. Pericarditis is frequently associated with pleurisy and pleuropneumonia. As has already been noted, true nephritis may undoubtedly occur. Otitis media occurs in some cases, and hemorrhage into the internal ear has in rare cases produced permanent deafness. Hemorrhage may occur into the skin. This is of comparatively frequent occurrence and hemorrhages into the mucous membranes are frequently recorded. Hemorrhages into the sclerotic coat are observed by all clinicians, and orbital hemorrhage with marked exophthalmus is recorded.

Dilatation of the right side of the heart may be due to bronchopneumonia, but in some instances the mechanical effects of the violent whooping-cough may be responsible. Ulceration of the frenulum of the tongue occurs in nearly 50 per cent. of the cases. Bouchut called attention to this symptom fifty years ago. The ulceration appears usually during the second or third week after the appearance of the whoop.

Optic neuritis may occur. Strümpel reports such a case, which recovered. He thought it was due to cerebellar ataxia following pertussis.

Diagnosis—It would be desirable to recognize the disease in its earliest stages, that is, during the catarrhal period. If this were possible we would have advanced a long step toward the prevention of the disease. The patient during the catarrhal stage is probably more infectious than at any other period. He infects other children on the playground and at school, as well as in the home. When the paroxysmal stage is reached with its typical whoop the merest tyro can recognize the disease. During the catarrhal stage the Bordet-Gengou bacilli are present in greatest profusion, though even at this period the isolation of these organisms is beset with difficulties, and their differentiation from influenza bacilli is by no means easy. The blood examination during the early stage sometimes assists in the diagnosis. According to Churchill, lymphocytosis is found during the catarrhal stage in 90 per cent. of the cases. H. Ashby (British Medical Journal, London, 1910) states that if the lymphocytes form 50 to 60 per cent. of the total number of white cells, and if there is a greater number of the large lymphocytes than normal, a presumptive diagnosis of whooping-cough may be made.

Baroch describes the blood cycle as follows: At the very onset of the disease a leukocytosis, with an increase in every variety; then a small cell lymphocytosis. The large lymphocytes follow the course of the small, but do not reach their greatest number until the small cells have become stationary or are diminishing in number. At the acme or defervescence of the disease lymphocytosis as well as leukocytosis diminishes and polymorphonuclear leukocytes begin to increase.

Netter and Weil point out that the complement-fixation method is not adapted to early diagnosis, because the specific antibodies do not appear before the second week of the convulsive stage.

Olga Hovitzky (Selected Studies from the Bureau of Laboratories, New York, 1914-1915) finds that agglutination tests in clinical diagnosis of pertussis compare favorably with the complement-fixation tests only in the first week of the whoop. In the latter stages of the disease complement-fixation antibodies appear more frequently than agglutinins.

Miriam Olmstead and Paul Luttinger (Archives Internal Medicine, July, 1915) come to the following conclusions: Complement-fixation tests on serum from 111 cases of pertussis, or suspected pertussis, support the theory that the Bordet-Gengou bacillus is the etiological factor in the disease. The complement-fixation test may be of value in the diagnosis of doubtful cases of pertussis.

Friedlander and Wagner ("Diagnosis of Whooping-Cough by the Complement-Deviation Test," American Journal Diseases of Children, 1914, Vol. VIII., p. 134) found this diagnostic method of value in all stages of the disease, early as well as late. They found in 18 cases of positive whooping-cough that the test gave 18 positive results and no negative. In 12 catarrhal cases they found 11 positive results.

There are a number of other clinical facts which assist in the diagnosis of whooping-cough during the paroxysmal stage.

The frequent occurrence of petechiæ and ecchymoses over the entire body, particularly on face, neck, and in the conjunctiva. One very often observes a slight edema of the face, the dark blue color of the eyelids. We have mentioned ulcer of the frenulum. Pressure over the larynx, or the introduction of a tongue depressor tends to bring on an attack.

Paroxysms of whooping-cough must be differentiated from the cough produced by enlarged bronchial glands. The cough that is due to the latter cause is not followed by a typical whoop. Indeed, Schick has pointed out that in whooping-cough the crowing is inspiratory, whereas in enlargement of the bronchial glands the crowing is expiratory. In bronchial gland enlargement, vomiting after the coughing attack does not occur, as a rule.

Prognosis--Most children recover from whooping-cough. It is only rare that a child dies during a paroxysm from heart weakness. Sometimes death occurs from emaciation and underfeeding on account of persistent vomiting. When death takes place it is usually the result of complications.

John Lovett Morse (Presidential address before the American Pediatric Society, 1913) makes a plea for more efficient public regulations relative to the control of whooping-cough. He took great pains to gather statistics by writing to all state boards of health seeking to obtain the number of deaths from whooping-cough, scarlet fever and diphtheria during 1911, and also from bronchitis and bronchopneumonia in children under five years of age.

He reports that in thirty states 6,251 died of whooping-cough, 4,232 from scarlet fever, and 9,579 from diphtheria. These are the reports from thirty states during the year 1911. His figures show that whooping-cough is almost everywhere more fatal than scarlet fever, and less fatal than diphtheria.

Whooping-cough is especially serious in southern states. Morse found that in North Carolina 736 children died of whooping-cough in 1911, against a total of 447 from scarlet fever, measles and diphtheria combined.

Paul Luttinger finds that the actual case mortality in whooping-cough is difficult to estimate owing to incomplete returns. It is probably about 1 per cent. The death rate per 100,000 population is about 7. It has been steadily decreasing for the last fifty years, having been as high as 58.2 in 1872 and as low as 4.71 in 1908.

That tuberculosis is a frequent sequel of the disease has already been stated. It may be mentioned in this connection, that whooping-cough may not only produce death, but that it also may materially affect the future health of the child. The various nervous complications may result in permanent paralysis or idiocy, and the pulmonary changes may give rise to bronchiectasis, emphysema, and pulmonary fibrosis.

TREATMENT—

Prophylaxis—The most appropriate subject for consideration before the American Society for the Study and Prevention of Infant Mortality is the prevention of disease and death. While the study of disease presents topics of all-absorbing interest, the end result of all medical research should tend toward the practical alleviation of suffering, the prolongation of life, and the prevention and cure of disease.

The prevention of whooping-cough presents many difficulties. In most instances the disease is not recognized during the catarrhal stage, which is undoubtedly more infectious than any other period of the disease. There are many atypical cases, both in children and in adults. Such individuals are carriers and may disseminate the disease far and wide. There are undoubtedly abortive cases, in which the disease fails of recognition and through which it is disseminated.

Consequently, if we view the problem of prevention frankly and calmly we are compelled to admit that the hope of eradication depends upon early diagnosis, more conclusive knowledge as to the specific causative factor, and the perfection of a prophylactic serum as well as a specific medication.

Czerny, in a recent number of the Jahrbuch für Kinderheilkunde (1915), contributes a defense of his ideas on whooping-cough and makes some very interesting statements concerning the contagiousness of the affection. Those who have visited his clinic, which was formerly at Strassburg, remember that he admitted whooping-cough children to his general wards. According to Czerny, the disease did not become epidemic in hospital or ward. He explains this as follows: The whooping-cough patient is kept at a distance of 1½ meters (about five feet) from his neighbor. Czerny has convinced himself that by the severest coughing the patient does not spray the expectoration five feet. In addition, Czerny points out, the patient should not be allowed to rise from his bed, wander about the ward, and possibly cough directly into the face of an unaffected patient. On the other hand, convalescent patients should not be allowed to approach closely the whooping-cough patients in bed. In order to carry out such a régime dependable nurses are necessary. He points out, further, that the nurse is not required to change her gown as she passes from patient to patient, nor is she required to disinfect her hands. He recognizes that chicken-pox and measles may be carried by the nurse, though there are differences in the way in which the various infectious diseases are carried. He insists that a nurse who herself is coughing or is ill with the disease may be a carrier, though her clothes and her hands do not carry the affection.

The possibility always exists that a patient may enter the hospital during the catarrhal stage, when the disease is most infectious, and in this way it may be spread throughout the ward or the hospital before the true nature of the condition is recognized. This does not occur in Czerny's wards, because the child with even the slightest cough is admitted under suspicion and is treated as above described. Czerny admits having had infections of measles, chicken-pox and scarlet fever in his ward, though a house epidemic of whooping-cough has never occurred. He finally states that it is more difficult to prevent infections of whooping-cough among infants than among older children, and that the nasopharynx in infants is particularly susceptible to infection.

The difficulties in the prevention of whooping-cough may be considered under the following heads:

(1) The disease is infectious during the early stages.

(2) The disease presents so few symptoms at the onset that the diagnosis can be positively made only after a lapse of considerable time when definite symptoms occur.

(3) On account of the mildness or atypical symptoms the true nature of the disease sometimes remains unrecognized during the entire course.

(4) In spite of an evident diagnosis the children are sometimes sent to school.

(5) Convalescents are sometimes admitted to their classes before the contagiousness of the disease has disappeared.

There are many difficult problems in the prevention of the disease. All are agreed that whooping-cough is an affection which is most favorably treated by living out of doors. If we attempt to isolate these patients, particularly in the homes of the poor, we are defeating the most important element in the treatment of the individual child. Isolation hospitals, as they are constructed and conducted, are not adapted at the present time to the proper treatment of whooping-cough. Disinfection in hospital or home is of doubtful value, because bacteriologists tell us that the Bordet-Gengou bacillus is scarcely viable away from its host. Morse has pointed out that the regulation of school attendance by quarantine and isolation and notification of health boards is indifferently provided for, if at all, and improperly administered at the best. This applies not only to American communities, but also to English and Scotch institutions, where neither quarantine nor disinfection are insisted upon. Conditions are not much different in Austria, Germany and France.

Another matter which increases the difficulty of preventing the spread of whooping-cough is the fact that the cough is frequently untreated or receives the favorite cough remedy from the mother or druggist, the nature of the cough is not recognized, and possibly the physician is called in late if at all. In the meantime the infected child has been attending school, participating in the recreations of the playgrounds, and carrying the disease in many directions.

The most important deduction that can be made from the accumulated evidence is that children who are suspected of suffering from whooping-cough should be kept from school until the nature of the cough is manifest, and in the same way infected children should be prevented from coming into contact with those who are well. There can be no doubt that much can be accomplished if the general public is better informed as to the dangers of the disease, its contagiousness, the importance of its early recognition and the necessity of isolation and quarantine. Physicians, teachers, parents and nurses should take pains to learn more concerning the introductory stages of the disease, and the methods employed in its prevention and propagation.

Paul Luttinger would reduce the morbidity and mortality of this disease by—

(1) Securing the coöperation of physicians in reporting all cases of pertussis and in using the specific vaccines as early as possible as a prophylactic measure.

(2) Quarantine of pertussis cases during the first two weeks of the disease.

(3) The use of suitably constructed hospitals where cases of pertussis could be properly treated and studied.

Frederic S. Crum (American Journal of Public Health, Vol. V., No. 10) closes an excellent statistical study of whooping-cough by saying: "The statistics of this disease teach that whooping-cough requires much more careful study than it has ever yet received; that it is still surrounded by a hazy nimbus composed partly of ignorance, and partly of half knowledge; that it is a disease, the mortality from which entitles it to more serious attention that it usually receives at the hands of physicians and parents."

Vaccine Treatment—The value of vaccine in the treatment of whooping-cough is still under consideration. The reports are conflicting. Some are sanguine. Alfred Hess (Journal of American Medical Association, September 19, 1914) found no curative results from the use of the vaccine during the disease, notwithstanding the fact that he used an autogenous strain in one series of cases. According to his statistics the prophylactic treatment cannot be regarded in any sense specific. Of 244 cases that were vaccinated 20 came down with the disease.

Matthias Nichol and Paul Luttinger treated whooping-cough with stock vaccine and came to the conclusion that the average duration of the treated cases was twenty-five days, and that cases which received both commercial and stock vaccines, 8 in number, lasted forty days.

Paul Luttinger, in his latest communication, says that when the proper vaccines are used there has been a shortening of the paroxysmal stage, and a reduction in the severity and number of the paroxysms.

Out of 2,103 patients with pertussis, 75 per cent. of whom were treated with vaccines 15 deaths occurred; 10 of this number were treated with medicine and 1 with injection of the vaccine. The other 4 were treated with vaccines exclusively, 2 of them being commercial vaccines and 2 others the stock vaccine prepared by Luttinger himself. No death occurred in any patient who presented himself before the third week and received the vaccine treatment regularly.

As a prophylactic, Luttinger thinks that the vaccine is efficient if used sufficiently early and that it is capable of aborting the disease if no time be lost in its use.

The possibility of immunizing by vaccination is still an open question for pertussis. Those who received prophylactic injections, as well as those who did not, remained free from the disease in about equal numbers.

The Hygienic Treatment—It has already been said that fresh air treatment, good hygiene and efficient nursing are the most important factors in the treatment of the disease. So far as drug therapy is concerned, there undoubtedly are medicines which relieve the paroxysms and insure rest and quiet for the patient. These are found among the antispasmodic and sedative drugs.

There is scarcely a disease where so many drugs have been employed and later on abandoned for some more popular remedy. The list of drugs is a very long one. It is to be hoped that a specific remedy will be secured which will prevent and cure the disease if used sufficiently early. One will suffice.

PARAPNEUMONIC EMPYEMA—L. Gerdine's (American Journal Diseases of Children, 1916, Vol. XI., p. 33) 15 cases of typical lobar or bronchopneumonia in children under four years of age were studied by exploratory puncture and bacteriological examination of the fluid obtained. He says that fluid is present in the pleural cavity in a large number of cases of pneumonia before the crisis and can be demonstrated, sometimes by physical signs, sometimes by Roentgen ray, and by puncture, even when other physical signs are not apparent. The clinical course of the pneumonia may not be altered by this complication. In the majority of cases the fluid is serofibrinous in character, though perhaps containing a large cellular element, polymorphonuclear in type. These fluids are sterile as a rule. True pus is present much more rarely and may contain organisms of more or less virulence. The frequency of the presence of organisms in these cases cannot be decided on the data as yet secured. The virulence of the isolated organisms determined by animal inoculation seems to be of value in prognosis. Only in cases with serofibrinous and purulent fluids containing organisms of a high grade of virulence should surgical interference enter into consideration.—*American Journal of Obstetrics.*

CARE AND ASEPSIS IN HOSPITALS FOR INFANTS

BY AUGUST STRAUCH, M.D.

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It is a generally observed fact that infants, when assembled in numbers in a room or ward, sooner or later experience injuries to their health. Such injuries are manifested in a standstill of the weight-curve, in irregularities of the temperature and in symptoms of dyspepsia with disturbances of nutrition; the latter may assume indeed a life-threatening character and even issue fatally.

These noxious effects, entailed by the care of infants *en masse,* have been observed under every method of feeding, even though qualitatively and quantitatively correct, including breast feeding, although they are more marked and momentous with artificial feeding; even under favorable conditions they are demonstrated in the difficulty or impossibility of obtaining such good results as in private practice or in well supervised dispensary work with identical principles of feeding and formulæ of mixtures. Although under the same regimen, the individuals are affected in various degrees—some more, some less, some not at all.

This universal experience has not an explanation in the fact, merely, that the human material in charity institutions, as a rule, compared with patients of private practice is of lessened resistance power and often chronically ill; for notwithstanding careful and scientific feeding, originally milder cases also do not thrive and even grow worse, especially with a long stay in the hospital. Besides this it has been demonstrated that aggregation of even healthy babies is productive of deleterious by-effects, while, on the other hand, infants are not likely to manifest these disturbances in rooms overcrowded with adults; on the contrary, there the disturbances of "hospitalism" will rather disappear. Babies who in hospitals had incurred the dangers of atrophy or did not thrive, rapidly improve when taken care of in private homes in an individualizing way, though these perhaps only half way fulfilled the hygienic requirements. The study of the underlying causes of the evil influences of aggregation upon children is of the greatest importance, for the usefulness of institutions depends upon the successful elimination of these detrimental factors.

Observations lead to the conclusion that these factors are of extraneous origin, invading the body from without, by the route of the respiratory or digestive tract; that the detrimental element of the "milieu hospitalier" is the crowded aggregation with its manifold opportunities for infections; that in separate care, on the other hand, the decisive factor for the thriving of nurslings lies principally in the isolation, which mainly is operative by protection against infections. If this is true, by elimination of all mediate and immediate contact between individuals in the hospital, an undisturbed thriving and improvement of the children should also be expected, well comparable to that in separate care.

I shall not here speak of the injuries by cross- and secondary infections or ward epidemics of the acute exanthemata, the transmissibility of which is long since known, and which early gave rise to proper isolation; but rather of those other injuries that, though less spectacular, in their total effect likewise have made children's hospitals unfit places, if certain rules are not put into effect. Types of such injuries of an obvious nature, and therefore early recognized, are represented by the catarrhal affections of the respiratory tract due to contact and air-infection. As is well known, infants readily contract grippe, angina and bronchitis; these affections in infants may exert an enormous detrimental influence directly or by reactions upon the nutritional processes, especially when the power of resistance is reduced by the primary affection. Clinically, it is the intestinal tract in particular that reacts from this infection, often with disturbances of a most marked degree, which, predominating over the other manifestations, may become the direct cause of death, or, in the surviving babies, cause untoward sequelæ. It is evident in the transmission of grippe that infection through air will play the greater rôle the shorter the distance between the individual beds and the less efficient the ventilation; therefore under unfavorable conditions repeated ward-epidemics run their course and frustrate to a marked degree the results of our care and nursing. We all are too familiar with the discouraging fact that infants will thus lose in a few days what they had gained in as many weeks. Important and consequential as are these disturbances, as a rule, they are transitory, rather seasonal and obvious in their etiology. But there are a number of other factors bearing upon "hospitalism" and operative in a more continuous way that have been more difficult of interpretation and perhaps can only be approached to a certain extent in a hypothetical way.

A number of facts apropos of hospitalism seemingly find their best explanation at present in Hutinel's ingenious theory. This refers the cause of the injurious hospital influence to the possibility of the rather avirulent microbes present in the feces of healthy infants, gaining virulence by passing through other infants; for this aggregation gives ample opportunity. These, then, with moderate virulence produce manifestations such as stagnation of the weight-curve and dyspepsia, and with the higher degrees of virulence more severe disturbances.

In studying the nature and causes of the malignant influences of hospitals upon children, Finkelstein noted a periodical appearance and disappearance in his station of a concentrated occurrence of acute gastrointestinal affections of light or severe forms. He ascribed these to contact-infections; the alternations of "good" and "bad" periods upon close analysis he traced back in every instance to infection by a newly arrived case of highly infectious gastroenteritis.

For the transmission of avirulent and pathogenic microbes from infant to infant there exist manifold opportunities, which in modern hospitals should naturally be eliminated to the utmost extent by strict observance of asepsis and isolation. The necessity of prophylactic measures, of course, extends not only to the older children with acute exanthemata, but particularly to infants who, without special precautions in general wards, exhibited appalling rates of mortality, so that in England, for instance, the paradoxical expedient was resorted to of refusing babies under two to three years of age admittance to most children's hospitals. The infant with his low immunity and lack of resistance represents a fertile soil for various infections. In the general ward or the crib he has an environment perhaps always more or less virulent and dangerous, for as Hutinel puts it, "almost all diseases are contagious at this age."

But while the requirements of strict anti- and asepsis have found ready recognition and practical application in the field of surgery and obstetrics, and while the rules of isolation in the acute exanthemata have been carried out from a comparatively early date, it is only lately in general hospital wards for children, affected with other than specific infections, that the last logical conclusions have been put into practice; at last prophylactic principles are gaining more and more recognition with the intention of preventing infections not termed specific, it is true, in the sense of the acute exanthemata, in the wards. Nevertheless, the all-importance of these principles is not yet universally realized nor everywhere put into practice to their full logical consequences; this knowledge is far from being the common property of physicians and nurses. In other instances physicians and nurses are unduly handicapped by inefficient, obsolete hospital equipment and furnishings, archaic architectural plans, in which children's wards have been treated merely as appendages of secondary importance.

Notwithstanding the existence of splendid models in the prophylactic sense in a number of institutions, in others at best we find only in some instances the application of prophylaxis carried out, as, for example, the sterilization of milk, bottles, nipples, thermometers, etc., also with the separation of infants from the older children in separate rooms; while in other points there is encountered a certain underrating of the importance of prophylaxis. Even in large institutions under ruling circumstances often only a part can be done of what Soltmann and other authorities of great experience declare as indispensable for the successful fulfillment and consummation of the purposes of infants' hospitals. Merely ordinary cleanliness suffices not, but asepsis that aims to approach the perfection of the surgical operating room is imperative.

It goes without saying, for instance, that the use of the old-fashioned bedsteads with four or five compartments for as many babies, separated only by low transverse boards—or even without these—is to be condemned, as likewise is the similar practice of crowding several infants in one bed, to provide for supernumerous arrivals under pressure of emergency. Cross-infections by contact and air are thereby given very great opportunity to do harm. To have beds placed at well-nigh contact distance of less than two feet, also conflicts with our modern conception of prophylaxis against air-infection. We should oppose the too frequent practice of examining the little patients in succession on the same table without a change of the linen and without fresh disinfection of the hands; cases of pyodermia, bronchitis, enteritis, etc., will thus cause contagion. The bathtub may prove a ready means of propagation of infectious agents, by receiving in close succession 10 or more children, one perhaps affected with enteritis, the next with bronchitis, etc., if the human factor, though trained, but perhaps overworked, should fall short in the automatically performed duty of disinfection between each individual child. We should not entrust the baby to perfunctory pseudoasepsis. If individual bathtubs for each child, placed, for instance, underneath its bed, as in Soltmann's clinic, cannot be installed, shower baths are to be preferred to a bathtub in common. The washing of the babies and the cleaning of their anal region upon the same table in common, in the toilet room, undoubtedly is fraught with dangers of transmission of microbes, unless strict precautions are unfailingly observed.

The use of one comb and one powder box for several children, the use of ointment out of one container for a number of babies, the feeding of babies and the preparation of milk by the same nurse who attends to diapers and feces; all these factors should not be overlooked as possible sources of infection. How often are the toys disinfected that we frequently see rolling on the floor or passed from the hands and mouth of one child to those of another; who is to prevent the older children, no longer bedridden, and mingling *ad libitum* in unobserved moments, from throwing foodstuffs to the floor, to be picked up again and eaten; are attempts being made against the spreading of infectious coryza and bronchitis, whose deleterious character has such a saddening effect upon the figures of mortality in our infants' wards? There is no need to enumerate any farther. The very mention of these factors will cause you to recall others which I have omitted here. Such conditions originate in a large measure from defective hospital equipment and furnishings and from an insufficient number of nurses, rendering impossible a distribution of the latter according to duties.

The improvements carried out with great success in modern hospitals consist in vigorous reforms of both architecture and management; the leading principles and viewpoints, established in France by Grancher and Hutinel and in Germany especially by Heubner, Soltmann and Finkelstein, crystallizing in the strictest avoidance of direct and indirect contact between the nurslings, in high training and appropriate numerical increase of the attendants. The basic rules to be followed have been formulated by Soltmann in the terse sentence: "I consider every child as infectious and susceptible in all parts of his body. I render all measures subservient to this principle, the correctness of which stands firm in my conviction."

These orders issued to the personnel emphasize not only the aseptic preparation of milk and similar points, now everywhere realized, but also the separation of all the belongings for each child, aseptic manipulation of the nipples, avoiding the contact of its upper part in putting it upon the bottle, the disinfection of the hands before the distribution of the milk, and between the attendance of each child, especially after taking care of the lower half of the body and the dejecta; for these latter duties separate nurses should rather be assigned. It is incumbent on such attendants to avoid any contact with the mouth of children or utensils destined for it.

The prevention of air-infection should be facilitated by "bed-isolation," that is, by a sufficient distance between the beds, which secures sufficient protection at 2 to 3 meters, or by the system of boxes, either closed or open; the latter proved in Heubner's clinic very efficient by a reduction of endemic respiratory and intestinal diseases in treating children with coryza, angina, bronchitis, bronchopneumonia, etc. Excellent results are reported, also, by Escherich and a number of others. Unfortunately the entire avoidance of these air-borne respiratory infections meets this difficulty, that a simple infectious coryza of the nurse or physician early in its initial stage may prove transmittable and deleterious to the little inmates. This danger also threatens from the visiting public, for which reason marked restriction must be enforced, visitors being forced to put on hospital gowns. Every child suffering from coryza, angina, etc., should be separated from the others. Naturally the more use is made of the open-air treatment, the easier will it be to avoid these ward infections.

We must also emphatically insist upon the temporary isolation of new arrivals, not only the suspicious ones, but of all in a quarantine station, organized, if possible, according to the closed system, before they are admitted to the general ward.

It is evident that the smaller the number of beds and the less the inmates change the more easily can these infections be eliminated. A number of small rooms containing a few beds only are therefore preferable to the customary large one-unit general ward with many beds, where even the best feeding therapy will be markedly frustrated and thwarted by inefficient measures against enteral and parenteral infections. Small separate units will also facilitate grouping of similar cases. Where the common ward cannot be dispensed with, subdivisions into small units by glass walls (Hutinel) should be established.

The complexity of all these requirements of true asepsis and general care in the modern sense makes it a foregone conclusion that the number of nurses necessary *pro rata* for children, especially for infants, must far exceed those necessary for the sick adult. A well child demands undivided attention and care, how much more the sick baby! Among German authors Heubner demands 3 nurses for 8 nurslings as the minimum, or 5 nurses for 8 children, and he declares such numbers indispensable for any success in artificial feeding. Biedert asks for 1 nurse for 2 to 3 babies and also several servants in addition. Baginski intrusts 4 children at the most to 1 nurse, and Soltmann requires 20 nurses for 50 beds; for with a less number the results will be poorer.

An institution for sick babies must also have an adequate supply of human breast milk; this principle is generally recognized as one of the firmest foundations of modern treatment. Without human milk in too many instances the feeding of sick babies in the hospital will completely fail of result. "The wet-nurse is to the infants' hospital what the operating room is to surgery." Human milk is no luxury, but a necessary dietetic and medicine.

A realization of all these measures and others, which for lack of space are not enumerated, will, of course, render hospital management expensive. Indeed, that hospitals, though admitting infants, should omit the necessary measures to better protect their lives and give them a fair chance to regain their health may be the fault of the communities or responsible authorities, either due to lack of funds or to indifferently ignoring the pleas of the hospital staff for the abolishment of some of the worst shortcomings and for necessary additions to the hospital equipment.

Wherever the preventive reforms mentioned have been inaugurated, the results have been excellent. Gancher and Hutinel, in Paris, secured a very striking reduction of ward-infections following the introduction of aseptic reforms, such as special rooms for changing gowns, washing and disinfecting hands, wards with floors and walls easily disinfected, iron beds, etc. Finkelstein recorded a reduction of the mortality by 22 per cent.; the number of children that had gained in weight at the time of discharge increased from 33 per cent. to 66 per cent.; the rate of death due to diseases contracted in the hospital fell from 49.1 per cent. of the total mortality to 14 per cent. Upon the basis of universal experience we may assert without qualification, that every improvement of hospital equipment becomes evident in a decrease of the mortality, particularly of those children who are lying in the ward for a considerable period. It is superfluous to quote additional testimonies to this fact, everywhere experienced.

This article, not dealing with a novel subject, hopes mainly to exert its influence where these principles have not found their due appreciation and materialization, my appeal being directed particularly to the administrators—too often laymen—of the institutions concerned, that is, to those responsible for the necessary provisions, architectural as well as otherwise.

By the enforcement of preventive rules and by individualizing feeding, the great onus of the former baneful hospital influence is broken, though not all possible elements are therewith exhausted, to which the injuries of aggregation may be traced, for undoubtedly the factor of "individual care," in a phase not related to asepsis, must also be considered here. Parrot, Baginski and others blame as a not indifferent factor the absence of amenities and psychic stimuli for the infant under hospital care, lack of those pleasures that the infant at home enjoys, where innumerable little attentions contribute to his comfort; where the slightest expression of displeasure or discomfort is noticed by the mother and solicitously attended to; where everybody also is ready otherwise to satisfy and supply him with psychic diversions.

The infant in the hospital, on the other hand, lacks all these elements. The wards in this direction have no resemblance to a normal home. In addition to that the continuous lying in bed in immobile dorsal posture with its danger of atelectasis, faults in offering the bottle, at times warm, at times cold, lying in wet and soiled diapers an undue time, swallowing the wrong way, cooling of parts of body, from stripped off covers, and a number of other errors represent a disregard for therapeutic imponderabilia, which in their sum total may well exert a noticeable influence upon the child's growth. It was recently pointed out by Smith and Le Webb that dorsal posture after feeding interferes with eructation of swallowed air and so may directly cause disturbances of the stomach function. The child in hospital care left entirely to himself, after days or weeks loses in its reaction from this unnatural state, seeming to vegetate, rather than to lead an animated existence; without psychic utterances, without stimuli, unless those of pain that force him to pityful whining; finally he hardly will react to cold or wet, and gradually drifts into progressive decomposition.

When entrusted in time to the individual care of mothering in the private home, the child will occur less dangers, even without the proper conditions of strict asepsis, so necessary in hospital care. However, we must caution not to overestimate this factor at the cost of observance of asepsis, since hospitals conducted mainly with aseptic prophylaxis without special regard to "natural care of nursing" gave favorable results, and, on the other hand, "individual care" alone in hospitals failed of these results, as Finkelstein has demonstrated experimentally. Yet the importance of "mothering" cannot be denied, especially in the presence of the achievements of Pawlow's school, that has thrown a light on the influence of the minutest psychic impulses upon the function of the vegetative nervous system. We cannot yet say to what extent these psychological elements enter the problem under discussion, since clinical or experimental data on this interrelation are not yet available in the case of infants.

Led by these theoretical considerations and by practical experience, we will have to observe the rule of not keeping children in the ward a longer time than necessary. Infants after recovery from gastrointestinal disturbances should be discharged into individual care at home or at satisfactory boarding homes, with directions to the mother, other caretakers and visiting nurses, in order to make secure the results obtained in the hospital. It is therefore urgently necessary to connect such a dispensary with the hospital, as the surgical departments have for the after-treatment of their patients, in order that we so may be enabled to control the further fate of our former patients by a continuance of our medical advices beyond the walls of the ward, and by supervision of home life. This, of course, requires coöperation with the various charity organizations. It is likewise imperative to discharge patients with affections of the respiratory tract as soon as feasible, since their prolonged presence in crowded wards involves the probability of reinfection and relapse, especially in debilitated children.

It is the best plan, in connection with hospitals of big cities, to create open-air camps, cottages or sanitaria in a country environment or on the sea coast for children convalescent or chronically ill, as exist, for instance, near Dresden (Soltmann) or Boston (Thomas Wilson Sanitarium). This open-air treatment in summer stations under forest trees gave results not duplicated, the open air proving one of the best stimuli in atrophia, anemia, rachitis, tuberculosis, pneumonia and a number of chronic diseases of the respiratory tract. At any rate, more liberal use of court-gardens, roof-gardens, open porches, balconies and solaria with flowing air must be encouraged in hospitals, and their proper construction urged to thus enable the little patients to enjoy to the fullest extent of the climatic conditions the benefit of outdoor life. Air and light, both important therapeutic agencies, should be made use of to a greater extent also in the wards. In fact, there is no reason why daylight should be shut out anxiously by drawn shades the whole day, as is too often done, or why just children's wards should have the characteristically disagreeable odor, indicative of a deficient ventilation.

Hospitals, when all these measures are materialized, will also serve the purpose of being educational institutions for nurses, young physicians, mothers and the visiting public; they will lessen the prejudice of the people—so prevalent in this country—against children's hospitals; the display of order, neatness and attentive care will bring home to their comprehension that the institutions serve best for the little patients placed in their trust, and that these conditions in their perfection should be emulated in home care. The internes and young visiting practitioners will be interested in and impressed by the scientific precision deemed necessary in infants' hospitals and they also will thus become emissaries for the propaganda of infant welfare and hospital sanitation in their own localities.

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A Previously Undescribed Form of Postdiphtheritic Paralysis; One-Sided Paralysis of the Hypoglossus—Frieda Lederer (Arch. f. Kinderheil., 1916, Bd. LXV., Heft III.-IV.) gives the history of a case of diphtheria in which postdiphtheritic paralysis occurred in some of the usual locations, followed by a one-sided hypoglossus paralysis characterized by lateral deviation of the tongue, and lack of taste on one side of the tongue, while temperature, touch and pain reactions in both sides of the tongue remained normal. After electrical treatment these troubles disappeared, as did the hypoglossus symptoms later.—*American Journal of Obstetrics.*

HEART DISEASE IN INFANCY AND CHILDHOOD*

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I come here to-day not to report the result of any original investigation, but rather to review a few of the interesting and practical points of heart disease in infancy and early childhood which the pediatrist and the general practitioner meet in their daily work.

In recent years, with the improvement of laboratory methods and their refinement in technique, also the use of the cardiograph, the polygraph, and the X-ray, a great deal has been added to our intimate knowledge of the working of the heart, its relation to the influences of the nervous system, and its dependency on the regulation of the internal secretions of the body.

When we can utilize all these various findings for a practical end, we shall be rendering a great service to the State and the community. For who among us has not seen at one time or another, possibly many times during the year, the great suffering endured by little children afflicted with cardiac disease and repeated attacks of decompensation, and for whom, until recently, so little had been done or attempted.

I have often recalled the closing remarks of an address delivered by our dear friend, and my preceptor, Dr. Abraham Jacobi, before the Alumni Association of Long Island College, as far back as 1888.

His subject was: "The Heart and Blood Vessels in the Young." In a masterly review of the subject, in closing, he says: "I rejoice in knowing and learning more profoundly, and feeling more keenly, year to year, that there is no nobler aim for the abstruse study and abstract science of medicine than its utilization in the service of mankind, and that every intellectual effort and every scientific gain ought to be, and finally will be, ennobled by being made subservient to a practical end. That practical end of all investigation and study of anatomical and physiological questions is the prevention and cure of disease. It is this combination of intellectual labor and practical result, undertaken and accomplished in the interest, at the same time of scientific research and the moral elevation and physical welfare of both the individual and the commonwealth, wherein lies the fascination of our professional calling."

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* Read by invitation at a meeting of the Glens Falls Medical and Surgical Society, November 29, 1916.

For practical purposes we may divide heart disease of infancy and childhood into (1) congenital and acquired, (2) organic and functional, (3) acute and chronic.

Heart disease in early life has certain characteristics which differ essentially from heart disease in later life. In the first place there is a decided tendency to recovery in early life which disappears in later periods. This might be explained by the fact that the heart is comparatively heavy and large in normal infants. Its weight in newborn infants is about eighty-nine one hundredth per cent. of the body weight, while in adults it is only fifty-two one hundredth per cent. of the body weight.

The cavity of the heart in the newborn, however, is small, about 23 c.c.m. compared to 100 c.c.m. at the seventh year, and about 140 c.c.m. at the fifteenth year. Its muscle is massive, equally thick on the right and left sides. That is why the valves, which are small and elastic, vibrate easily and quickly.

Another difference is the undeveloped condition of the infant and young child. Any interference with the normal development of other organs or parts of the body may result in disturbances which directly influence the circulation, and directly or indirectly the heart itself.

There are certain anatomical factors connected with the ossification of the bony structure of the chest-wall, such as the ossification of the sternum, deformities of the thorax, which may result from continued pressure of the heart within, on the soft and pliant structure without, a condition so frequently met with in rachitis (of early life). Not infrequently we see in the young rachitic child a decided bulging of the entire chest-wall from intrathoracic pressure. On the other hand, if ossification occurs prematurely, there may be very little room left for the growth and development of the heart, which may result in certain cardiac displacements and the production of so-called extra-cardiac murmurs.

The weight of the heart in the newborn is approximately $20^6/_{10}$ grams, at one year and a half 44½ grams, at three years about $60^2/_{10}$ grams, at five and a half years $72^8/_{10}$ grams, at ten years $122^6/_{10}$ grams, at seventeen years $233^7/_{10}$ grams.

The yearly increase is largest during the first few years, a little less about the fourth and fifth years, and larger again about the age of puberty. After this time the annual increase is smaller, but continues until old age. The absolute weight increases until the seventieth or eightieth year.

The absolute proportionate weight of the heart in the embryo is very great when extensive circulation in the allantois ceases. The heart of the embryo grows rapidly. It not only supplies blood for the growth of the body, but also for the cord and the placenta. This increase in weight of the heart is most noticeable in the first half of embryonic life, regardless of difference in sex. The increase in weight is chiefly confined to the ventricles.

In the embryo it is the muscular mass of the right auricle which predominates over the left from the beginning of the second month after birth, and during the whole of the first year the right and left auricles are equal. After that time the right auricle continues to grow more rapidly than the left, so that during and after puberty its weight is more by 5½ per cent.

The right ventricle is extremely active during embryonic development, because of the existence of placental circulation, the accumulation of large quantities of blood and the patency of the foramen ovale, through which large amounts of blood are impelled into the right heart.

The equality of both auricles during infant life is due to the absence of great muscular exertion, and the renewed increase of the right auricle during later life to the effect of muscular action on the distribution of the blood.

Diseases of the blood vessels themselves, such as aneurism and so forth, are extremely rare in infancy and early childhood. This may be explained by the favorable relationship of the heart to the larger blood vessels.

Congenital Diseases of the Heart.—For many years past congenital heart disease has been a study of many well-known pediatrists and pathologists. Much has been written on the subject, but still, if we consult most of the text books which deal with this chapter, we find not only a great diversity of opinion, but a rather vague knowledge of certain anatomical facts.

In order to perfect our knowledge of congenital heart disease it will be necessary to compare the antemortem notes with the postmortem findings. The first person to undertake this work was Bednar, Professor of Children's Diseases in the University of Vienna in 1856. In his excellent text book on Diseases of Children, he reports the result of 40 observations at the bedside, and then explains the various antemortem conditions with the postmortem findings. Since then a great deal of work has been done in a similar direction. The most recent monograph written on the subject was published by Dunn, of Boston, a few years ago.

For all practical purposes I would suggest that we divide congenital heart disease into the following groups:

(1) Those cases showing a thrill, cyanosis, enlargement of the heart, and a murmur.

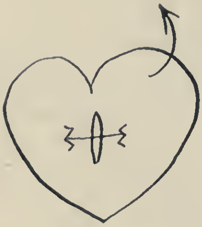
(2) Those cases showing no cyanosis, but enlargement.

(3) Those cases showing neither cyanosis nor enlargement, but murmurs.

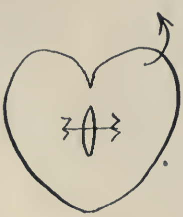
In the first group of cases I would include cases of pulmonary stenosis. Pulmonary stenosis alone, I believe, is a very rare condition. Infants suffering from pulmonary stenosis alone die within a few days after birth.

When the pulmonary stenosis is accompanied by some other compensating murmur, these children may live and develop, but always with an impaired nutrition and lowered resistance to the usual outside influences.

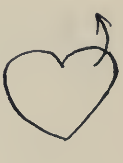
In order to illustrate more clearly these various groups I have devised the following schematic diagrams:



Thrill
Enlargement
Cyanosis
Murmurs



Enlargement
Murmur



No cyanosis
No enlargement

In the first group we have those cases showing a thrill, enlargement of the heart, cyanosis and murmurs. If the murmur is heard over the heart area and transmitted from right to left, we are dealing with an open ventricle. If the murmur is transmitted upward into the vessels of the neck, we are dealing with an open ductus arteriosus. When cyanosis is present there is usually a complicating pulmonary stenosis.

In the second group of cases, pulmonary stenosis is always absent, there is enlargement, but there is never any cyanosis. If the murmur is confined to the heart area we have an open ventricular septum alone. If the murmur extends upward into the vessels of the neck, we have a complicating open ductus arteriosus.

In the third group of cases there is neither enlargement of the heart, nor cyanosis. If there is a loud murmur heard over the heart in these cases, the usual complication is an open auricular septum, with the murmur transmitted upward into the vessels of the neck, an open ductus arteriosus.

The first and second group of these cases usually show some signs of cardiac embarrassment. They suffer more or less from gastrointestinal disturbance, are usually weak, show disturbances of nutrition, and have very little resistance to the usual infectious agencies of early life. As a result of this, from repeated attacks of disease, the heart becomes more or less decompensated, and these children usually succumb about the tenth or twelfth year of life.

The third group of cases, however, show absolutely no signs of cardiac disturbance; they grow up to be normal, well-developed children, without any handicap whatsoever.

There is very little to be said about the treatment of the first and second groups of cases suffering from congenital heart disease, except that they must be protected as much as possible from the dangers of exposure and infection of daily life.

Fortunately, congenital heart disease represents less than 1 per cent. of all cases of heart disease that come under our observation.

Functional Murmurs—The possibility of the existence of functional cardiac murmurs in early life was absolutely denied up to the year 1888. On reviewing literature up to that time it is interesting to note the many controversies that took place in reference to these functional disturbances of the heart.

In a paper published by Jacobi in 1888, he states that the hearts of infants and children exhibit functional murmurs but rarely. Whenever there are murmurs present it is safe to attribute them to organic, rather than to functional disorder.

At that time two eminent authors, Hochsinger and Soltmann, denied absolutely the occurrence of functional murmurs in the first three years of life. Since then, in fact but two years later, Jacobi pointed out the error of the statement. He published a number of interesting observations of murmurs that he had heard during life, and was able to show those very same hearts postmortem, presenting in every particular a perfectly normal condition. Since then many similar observations have been made, and we know and see very frequently murmurs occurring during various infectious diseases, which gradually disappear during convalescence, or in the weaks or months following.

During every infectious disease there is more or less myocardial degeneration. This myocardial degeneration may be very slight or very severe, according to the virulence of the infective agent.

The myocardial changes in the mild form exhibit slight deposits in the myocardial tissue, and in the severer forms result in segmentation and the possible destruction of certain muscle bundles, which ultimately become destroyed.

One of the most frequent causes of myocardial degeneration is rheumatism. In 1904, Aschoff was the first to call attention to the so-called rheumatic deposits in the myocardium, as well as those affecting the endocardium. Frankel also reported 20 cases with similar findings shortly after.

These nodules are developed from the periadventitial tissues of the vessels, are microscopic in size and consist of nodules made up of large cells, with one or more irregular polymorphous cells, and often, but not always, of smaller or larger lymphocytes, as well as the ordinary polymorphonuclear lymphocytes.

Other changes than the above that have been noted are described as hyaline degeneration of the muscle fibers of the heart.

The most persistent and intense myocardial changes are produced by influenza and diphtheria. The resulting murmur is usually extensive and mostly heard in the mitral and pulmonary regions. Sometimes there is also an increase in the transverse dullness of the heart, but more characteristic than the extensive murmur, which often by the absence of localization facilitates the differential diagnosis, is the irregularity of the contraction of the heart. This irregularity is due to the fact that the diseased muscle-bundles contract more slowly and irregularly than the surrounding muscle-bundles. As the heart valves are attached to the heart wall, these irregular contractions pull the various chordæ tendineæ at different intervals, pulling the valve irregularly, thus preventing its proper closure at the allotted time and causing a resulting murmur.

These myocardial changes have a distinct and important clinical bearing on the development of serious complications in the course of infectious diseases, and many an infant life can be saved by early recognition and treatment.

During the course of a year we see many cases of pneumonia at our institution, and our death rate, I believe, is lower than that of any other hospital in New York. I attribute this fact to our routine procedure of beginning stimulation at once, to prevent, as far as possible, these myocardial changes from progressing, as they have a tendency to do, during the course of all infectious diseases.

I have often heard it said that a case of pneumonia will get well without any treatment. A great many cases do, but we also see cases which near, or at the time of, the crisis develop a collapse and, notwithstanding active stimulation, result fatally. If the heart is stimulated early, and the stimulation regulated by the appearance and intensity of the accompanying murmur, always watching whether there is an increase in the size of the heart, due to myocardial weakness, we can improve the tonicity and contractibility of the myocardium, so that, when an unusual amount of unneutralized toxin puts an extra strain on its functions, with added stimulation it will always be able to withstand the strain.

I have often drawn a simile of an athlete who is in training for a hundred yard dash; if he were to go out and run his hundred yards without any preparation he would very likely fail in the attempt; but if he started weeks in advance and would run five yards a day for a week, then ten yards, and so on, on the day that he would run one hundred yards he would find it no effort, and so in the treatment of all cases exhibiting myocardial changes we begin our stimulation early and individualize with the dosage as the exigencies of each case demand.

Organic Heart Disease—The problem of organic heart disease with us in the hospital represents by far the largest group of cardiac disease that we see during the course of the year.

Twenty-five per cent. of the admissions to the Children's Division of the "A. Jacobi Department" of the German Hospital are cases of heart disease. Of the 25 per cent., 20 per cent. are cases of rheumatic heart disease. A little over 4 per cent. those resulting from various forms of infectious diseases, and the remaining, less than 1 per cent., are congenital heart trouble.

These cases of organic heart disease come to us in all stages of decompensation. The most common form of organic heart disease is mitral insufficiency with its accompanying, so-called, double mitral murmur.

This group of cases represents the most intractable and pathetic forms of cardiac diseases that come to us for relief and treatment. The etiology is always the same. Repeated attacks of rheumatism, either muscular or articular in character, often designated by the laity as "growing pains."

I desire to call your attention to the indifference with which a great many people regard these "growing pains" of early life, which are the cause, after repeated attacks, of severe forms of organic heart disease.

It is not always necessary to have a murmur in these cases of rheumatic endocarditis. It is often proved at the autopsy that when the deposits take place at the insertion, and not at the free margin of the valve, there need be no murmur. With the endocarditis there is usually an accompanying myocarditis, or, in the mild forms of the disease, and in its early stages, only a myocarditis alone. It is therefore vital that the treatment of this large group of rheumatic heart disease be begun at the earliest possible moment, in order to prevent these complications, which only prompt recognition can avert.

If my visit bears no other fruit than the dissemination of the knowledge necessary to help formulate a plan of early diagnosis and treatment which can be pursued with this class of patients, I shall feel that my visit has not been without results.

For the past twenty years all cases of rheumatism that I have met with I have treated in the following manner: During an acute attack I give the patient salicylate of soda; if this is not well born by mouth, I use it per rectum. I do not believe that there is any other drug that is as specific in its action. If there is already an accompanying heart condition, I use fluid extract of digitalis and sulphate of spartein, in rather large doses. If there is no accompanying heart complication I give smaller doses and examine the heart at frequent intervals to observe any occasion for increasing the dose. The children are kept in bed until all vestige of pain has disappeared, and the heart sounds have improved or become normal. The children's guardians are then warned of the so-called "growing pains," and the moment the pains reappear, or difficulty in walking is noticed by the parents, the children are at once placed in bed and the salicylate given every hour or two until the pain has disappeared. I usually give the salicylate, after an attack, two or three times a day for two weeks longer. So much for the medication.

Children with rheumatism should not be subjected to extremes in temperature. Rapid evaporation from the surface of the body should be avoided. In summer light cotton underwear should be used, and in winter a mixture of wool and cotton will be found more serviceable, as it is not so heavy as the wool alone, and, I believe, absorbs perspiration more readily than the all-wool garment.

The children should receive daily luke-warm baths, never hot and never cold, followed by a brisk rubbing with a coarse bath towel. If there exists any adenoid growth or enlarged tonsils they should be removed. When the children come in from the street after play their stockings should be removed, their feet rubbed dry, and a fresh pair of stockings substituted. Damp dwellings should be avoided. Parents with children subject to rheumatism should be told that they may not live on the ground floor. The sleeping room should be sunny and have a southern exposure, if possible

In reference to diet: Beef should be avoided, especially beef juices or extracts; spiced and fried foods should not be permitted. Sweets, such as candy and pastry, should be forbidden, and, above all, coffee, tea and alcohol. You would be surprised to know how many families in the poorer districts of New York give their children one or all three of these beverages daily.

Just as important as the facts enumerated is the vigilant watching of these cases to see that these rules are followed. In the better class of families there is very little difficulty; in the poorer class it is necessary to employ Social Service nurses to go into the homes to see that the medicines are given, that patients receive the proper food, that the conditions in the home are made as favorable as possible, and to bring the children to the hospital and dispensary for further medical observation and instruction.

Further than this comes the instruction and care of the older children who go to school. We are undertaking in New York at the present time, as you may know, the regulation of the care of school children suffering from cardiac disease.

It is estimated, approximately, that at least 20,000 school children are suffering from one or other form of cardiac disease. In Yorkville, which includes the section in which our hospital is situated, 600 school children were found to be suffering from heart disease, so that the question of regulating the future of these children, avoiding the necessity in individual cases of running up and down flights of stairs, the supervision of their physical exercises in the school, and their play outside, becomes quite a large and difficult problem. Also the regulation of their studies in preparation for their future careers, to decide in individual cases the proper vocational studies to fit the various forms of cardiac complications is receiving consideration.

In this way we, as medical men, are in a position to offer our services, not alone in the prevention and cure of cardiac disease, but to enable those already suffering from this unfortunate condition to become useful citizens of the community, thereby saving the State a considerable outlay of money for the maintenance of dependent individuals crippled and rendered helpless by the ravages of advanced cardiac disease.

136 West Eighty-seventh Street.

DUODENAL ULCER IN INFANCY AN INFECTIOUS DISEASE—L. Gerdine and H. F. Helmholz (American Journal Diseases of Children, 1915, Vol. X., p. 397) state that Rosenow has conclusively established the fact that gastric and duodenal ulcers of the adult are the result of an infection with a streptococcus of particular virulence. That this holds good for duodenal ulcers of the infant also is shown by the following facts summarizing the work of Gerdine and Helmholz: (1) The appearance of duodenal ulcer in epidemic form. (2) The presence of diplococci and streptococci in all eight ulcers of the present series available for study, and in ten out of fourteen ulcers of a previous series of cases. (3) The isolation, at necropsy, from one ulcer, of a streptococcus viridans, which when injected into dogs and rabbits localized in the pyloric end of the stomach and the duodenum and produced there hemorrhages and ulcers.—*American Journal of Obstetrics.*

SOCIETY REPORTS

JOINT MEETING OF THE PEDIATRIC SECTION OF THE NEW YORK ACADEMY OF MEDICINE, THE NEW YORK STATE SOCIETY, THE NEW JERSEY PEDIATRIC SOCIETY, THE PHILADELPHIA PEDIATRIC SOCIETY, AND THE NEW ENGLAND PEDIATRIC SOCIETY

Held in Boston November 4, 1916

Alexander H. Eastman, M.D., President of the New England Pediatric Society, in the Chair

The physicians and their guests assembled at the Harvard Club at nine o'clock in the morning and spent the day visiting various institutions in and about Boston. At the Massachusetts General Hospital Dr. Fritz B. Talbot gave a talk on "Problems in Metabolism" and exhibited the apparatus which he uses in making his estimations. At the Boston Dispensary, in which about 3,500 new patients are treated annually in the Children's Department, Dr. Maynard Ladd gave a clinical demonstration with special reference to feeding. At the New England Home for Little Wanderers, Dr. W. R. P. Emerson spoke on the "Problem of the Delicate Child"; one of the features of this institution being the study of problem cases. Dr. John Lovett Morse gave a clinic at the Children's Hospital. At this institution, in 1915, over 600 children were treated in the medical wards and the total number of visits made in the various out-patient departments was 42,237. At the Infants' Hospital, Rotch Memorial Building, Drs. Dunn, Howell and Grover demonstrated their methods of giving intrasinus injections. A visit was made to the Baby Hygiene Association, where Dr. J. Herbert Young described the work of the Association, which conducts 13 infant welfare stations in the city of Boston. The work is entirely educational and preventive, not remedial. In 1915, this Association cared for 4,792 babies. Luncheon was served at the Harvard Medical School, after which a visit was made to Waltham, Mass., where the State School for Feeble-minded Children is located. A most interesting clinic was given here by Dr. Walter E. Fernald, Superintendent of the School.

Evening Meeting

MEDICO-EDUCATIONAL PROBLEMS IN THE TREATMENT OF ATYPICAL CHILDREN

Dr. G. Hudson Makuen, of Philadelphia, said that in the new order of things the physician was beginning to realize more and more the importance of treating his patients rather than their diseases, and therefore in his preparation for the practice of medicine he was finding it necessary to study psychology as well as physiology, anatomy and chemistry. This was the natural consequence of a fuller realization of the fact that there was something which distinguishes the human organism from a mere laboratory receptacle or test tube, and this something was obviously the mind or personality of the individual. The fact of the close relationship between mind and matter was now generally recognized, and we knew that the physical organism of man was the basis of his psychical development. We were beginning to be convinced that physical health was in some way related to and dependent upon psychical health, and that a man always tended to be what he willed or desired to be. Moreover, the modern thought led us to the conviction that the prevention of disease was even more desirable than the cure of it, and to no class of physicians should this belief so strongly appeal as to those having the care of children. It was well known that the inefficiency of adult life was due largely to the mistakes of childhood, but it was not so well known that many of the actual diseases of later years might be traced to faulty habits acquired during infancy and adolescence.

Medico-educational methods were applicable in a measure to all classes of patients, but they were especially indicated in the treatment of atypical children, and, as Dr. Oliver Wendell Holmes had suggested, to be curative in every instance they should be instituted several generations before the birth of the child. Medico-educational methods had, therefore, a twofold function, namely, the prevention of disease and the cure of it. The chief obstacles to the successful practice of any medico-educational methods were those that arose in outlining a suitable course of procedure and in having it properly carried out. To meet these difficulties the man must be a medical man and an educational man; he must be at once a physician and a teacher, a physiologist and a psycologist; he must know his medicine well and he must know the workings of the human mind equally well. He must not only know what should be done for the prevention and cure of certain abnormal conditions, but he must know how to do it and how to teach others to do it, and the great medico-educational problem was to make men do the things that were good for them and to leave undone the things that were not good for them. Physicians were constantly making the mistake of separating the mind from the body in their diagnosis and treatment of disease, and this was especially true in the diagnosis and treatment of diseases of children. The mind of the child was always a product of function of the child's brain, and defective mentality always suggested a defective action in some of the cerebral structures. This defective action did not always necessarily indicate organic cerebral defects, but it might be due merely and wholly to a bad start in the growth and development of the brain tissue. A study of child psychology taught us that of all the organs of the body the brain was the most susceptible to physical and functional development. The cerebral convolutions increased enormously in number and the cortex underwent a corresponding increase in its surface growth during what we called mental development. The so-called associational fibers of the brain were merely rudimentary in early childhood and only attained their full functional powers after years of growth and development. These anatomical and physiological facts must be taken into consideration in the application of medico-educational measures, and we should keep in mind that the physical development of the child's central nervous system was largely the result of, and directly dependent upon, his early psychical activities. A striking difference between the mentally normal and abnormal child appeared in the fact that the one developed automatically, while the other halts in his development or, actually in some instances, lost ground or underwent a retrograde development. The physician's aim in the treatment of atypical children should be to assist them in both their physical and mental development, and the phrase that best expressed this work was psychophysical education. The two important things to keep in mind in the psychophysical education of children were:

first, correct postural attitudes, and, second, the development of normal respiration, phonation and articulation. These two things had been said to constitute a cardinal principle in the treatment and prevention of disease. The training of speech was of special importance because of the close relationship between the so-called mental faculties and the organs of phonation and articulation. These physical exercises had a psychical value far beyond that which was usually attributed to them and when they could be made use of in the training of atypical children they should not be neglected or supplanted by the usual methods of manual training. Atypical and backward children should not be coddled, but encouraged, and like the plants of slow growth, in some instances, they might be "forced." This might be done by supplying favorable conditions for growth and development and by directing their physical activities in the right channels. Comparative ill health was not always a contraindication, but oftentimes a decided indication for this forcing process. Many a nervous child immediately began to improve physically as well as mentally when well-directed pressure was brought to bear upon him in psychophysical education. This was due to the fact that the child might have been wearing himself out nervously by his aimless and ill-directed activities, and judicious training in such a crisis often resulted in a much-needed rest to both mind and body. It was said of older people that it was not work that kills, but worry, and we were inclined to overlook the fact that this was true even in young children. The satisfaction of having performed constructive work in a successful manner was not confined to mature men and women, but might come very early in the lives of children, and it was not too much school work that impaired the health, but too little that was adapted to the individual needs. Nervousness was the most characteristic state of the atypical child. In the majority of cases this was due to a neuropathic heredity, coupled with unsuitable and unfortunate environment. Although the physician could do nothing directly to change the child's heredity, he might do much to make the environment more suitable and more favorable by at once instituting medico-educational measures. The physician was the only one who could direct this treatment because he alone could know whether the symptoms were of organic origin or whether they were more or less functional, and therefore subject to psychical or emotional treatment. The so-called hereditary tendencies were frequently aggravated and encouraged by faulty parental attitudes, which were usually the result of ignorance, selfishness or overanxiety. Atypical children were, for the most part, spoiled children. The most difficult thing in the treatment of atypical children was to control and direct this parental influence and enlist it in behalf of the child's welfare. In some cases the parents were hopeless and it became necessary to remove the child from the home environment. Several cases cited served to illustrate very well how atypical phychological conditions might be acquired by children prior to school age, owing to faulty environment and inadequate training, and another case was cited as showing what could be done for such children in the way of prevention.

Dr. Makuen said that the play instinct was an important factor in child development, but it was at the present time the most overworked one of them all, both in the homes and in the primary schools. What might be called the work instinct was equally important, and it was now being greatly neglected in the early training of children. The difference between play and work should be clearly understood by the child and the greater dignity of the latter should be impressed upon his mind at an early age. The child should be taught to do things not because they were easy, but because they were right, and the greater the difficulty of doing them the greater the educational value. Moreover, work and play should not be commingled, but they should form two distinct factors in education. Correct postural attitudes and good respiratory, phonatory and articulatory habits should have a conspicuous place in all medical educational methods, because of their esthetic value and because they tended to give to the individual greater self-respect, self-reliance and self-control.

INTESTINAL VENOUS STASIS: DIFFUSION OF BACTERIA AND OTHER COLLOIDS

Dr. Fenton B. Turck, of New York, stated that the synthesis of organic compounds and the rôle of the physics of colloids in biology had created a new concept of normal and abnormal conditions of the body. The membrane filter was itself colloidal in character and determined the rate of diffusion of the colloidal suspension that filtered through it. Many factors were involved in the permeability of membranes in the living organism. Such colloids as the white of an egg would pass through animal membrane unchanged, though it was sometimes difficult to identify these colloids after their filtration. The writer had found that emulsion of bacteria, such as the cólon bacilli, injected into the intestines of a fetal animal or of living animals would rapidly diffuse through the membranes and tissues. By appropriate staining methods the rate of diffusion and the route by which diffusion took place could be easily studied. The author had published the results of previous experiments, which indicated that the intestinal tube was permeable to the intestinal flora. The degree of this invasion was greatly influenced by the splanchnic circulation, which altered the character of the intestinal wall and rendered it more permeable to all forms of bacteria. Microörganisms injected into the intestines of a fetal animal rapidly diffused through the mucous wall of the intestine, between the glands, into the areolar tissue, and then coursed along the wall of the intestines between the muscle coat and the mucous membrane. At this point many of the microörganisms underwent bacteriolysis. The passage of bacteria took place from the intestinal tract into the intestinal wall between the epithelial cells and not through or into the cells and between the muscle cells of the muscularis. Dr. Turck said he had called this submucous zone, where the bacteriolysis was seen to take place, the "zona transformans." In the newborn there was no barrier or arrest of the passage by the mucosa labyrinth; a wall impervious to the bacteria had not yet been sufficiently formed there, nor apparently were antibodies adequately generated, since as yet they had not been needed. As the body grew the tissues became less porous to bacteria, but when the splanchnic circulation was interfered with and muscular atony of the wall of the alimentary tract was produced, there was a reversion to the fetal state of the intestine, and then the body needed protection from the toxins produced in the "zona transformans" and anti-anaphylaxis, it might be said, was automatically established.

The degree of permeability of the intestinal wall in a living subject was increased by a number of factors, namely: (1) Mechanical obstruction of the intestines. (2) An interruption of the circulation sufficient to cause atony. (3) An interference with the nerve supply. (4) A number of pathological conditions. In order to produce permeability of the intestinal wall, there must be fundamental changes in the flora of the individual and in the physiology of the organ. Such changes might be brought about by thirst, hunger, overfeeding and shock. Experiments were described in which these various factors were tested, and the results supported the proposition already made that bacteria passed readily through the mucous membrane into the submucous tissue, where they underwent bacteriolysis and created lesions of a noninflammatory character. The autolysis that took place following venous stasis resulted in asphyxia of the cells. The muscle cells underwent the characteristic changes of Zenker's degeneration with atony and dilatation. Feeding experiments had shown that various lesions, such as ulcers of the stomach and duodenum, could be produced in animals, and other experiments had been made which demonstrated the result of the application of ligatures to the intestines at different levels. Ligations of the lower portions of the intestinal tract were not so evident in causing bacterial invasion as in the upper segments. No bacteria seemed to enter the blood or lymph vessels. The feeding experiments further showed that fat and fatty acid increased the diffusion rate of the intestinal bacteria through the intestinal wall and hastened the fatal termination. Six monkeys fed with small squares of bread fried for thirty minutes in cotton-seed oil, in addition to the usual vegetable feeding, died in from three to six weeks and showed an increase in the filtration of bacteria into the tissues. Lesions resulting from disturbances in the upper intestinal tract were shown to be more rapidly fatal than those made in the lower segments of the intestines. The passage of living bacteria into the tissues caused a reduction of the protective bodies and resulted in autolysis.

Dr. Turck illustrated this part of his paper with lantern slides showing the histological changes that took place in the tissues as the result of bacteriological invasion. He then considered the clinical picture in the human being which paralleled the findings described. Stasis induced by frequent feeding caused precipitation and delayed digestion, which resulted in fractional digestion and the production of fatty acids. The changes in the cells were not due to lack of oxygen or increased carbon-dioxide, but were due to acidosis, the result of fatigue to the muscle cell and asphyxiation of these cells from venous stasis. This produced atony and permeability of the muscle wall and diffusion of the bacteria and of the factional protein products. Following the bacteriolysis and proteolysis, anaphylaxis ensued, or, in other words, a condition of acidosis. The symptoms of acidosis in its acute form were shock, distention, prostration, convulsions, etc. The symptoms of the chronic condition were wasting, anemia, marasmus, etc. Treatment must have for its object the reduction of fatigue of the hollow muscle; prevention of fatty acid intoxication, intestinal retention, and absorption of intestinal flora; it must also correct the acidosis, reduce venous stasis, increase immunity, and maintain nourishment. Thus in the acute cases gastric and colonic lavage and lavage with weak nitrate of silver were indicated. These were to be followed by sodium bicarbonate, emulcents and venesection, followed by the infusion of sodium bicarbonate. In the severe cases the transfusion of autoserum might be indicated and also the continuous bath. In the moderate and chronic cases, gastric lavage and colonic lavage with gentle pneumatic gymnastics were indicated, together with demulcents, oil of cloves, and vaccines. The food should be reduced to the minimum fineness of particles, the interval between meals should be prolonged to the maximum point within the limits of caloric safety, and regular feeding periods should be established. Foods rich in mineral salts should be provided, such as vegetables steamed (not boiled in water) and made into a purèe. The intake of fat should be reduced to the minimum; heated and stale fat should be prohibited. No extractives should be allowed, though to older children one might give extract-free meat. The medication consisted of alkalies by the stomach and an analgesic mixture. A demulcent, such as Irish moss or liquid vaseline, prevented the passage of bacteria through the intestinal wall. Absorption of the bacteria was favored by the administration of Fuller's earth, charcoal or very fine bran. If laxatives were required phenophthalein and calomel might be given.

THE EPIDEMIOLOGY OF BACILLARY DYSENTERY

Dr. W. G. Smillie, of Boston, presented this paper, which was the result of a study made in connection with the work of the Floating Hospital. He stated that the incidence of bacillary dysentery was greater than that of greater feared and more widely advertised children's diseases, as poliomyelitis, and among children the death rate was equally high. While the cause of bacillary dysentery of infants had long been known and the methods of treatment had received careful study, the mode of the transmission of the disease had been a factor exciting only indifferent or random speculation.

The Floating Hospital furnished conditions most favorable to a study of the mode of transmission of bacillary dysentery because of the fact that the victims were infants usually under fifteen months of age, whose activities were limited; they travelled but little, came into contact with but few people, and ate but one or, at most, only a few articles of food. They very soon found that it was comparatively easy to trace infection in a baby under one year of age, but most difficult to trace the infection after the child could walk. Another advantage of the study was the fact that the diagnosis of bacillary dysentery was clear cut; first, with a definite clinical history; second, by means of the isolation of the dysentery bacillus from the stools, and, third, because of the development of specific agglutinins in the blood of the patient. Most cases showed at least two of these three factors. A good working basis for their investigation was furnished by the facts that the disease was due to the dysentery bacillus, which had been well described and was readily recognizable; the bacillus was found in the feces only and not in the other excretions; and thus they knew that every case represented some short path between the infected feces of the patient and the mouth of the victim; the incubation period in adult dysentery at least was short, from three to seven days, and the disease in infants was a summer disease with the highest incidence in July, August and September, and, finally, bacillary dysentery had a preference for the children of the poor.

In order to study all factors that might play a part in the disease a daily report of all cases as they occurred was received from the city boards of health of all reported cases, thus bringing out nests of infection in various parts of the city. A spot map was made of all cases of last year, both from the Floating Hospital and the city boards of health. A record was kept of the daily, maximum, and mean temperature and of the relative humidity for the whole summer in order to show the relation between these factors and the case incidence. Records were kept of the nationality of the parents, housing and individual home conditions with reference to sanitation. A careful investigation was made of all the activities of the case for a period of two days before the symptoms of the disease developed; also the history of any illness in the family, or the neighborhood, of all places visited and all food eaten, day by day. Seventy-nine cases in all were studied, 49 of them being house cases, and 26 related cases, discovered in the course of the investigation. While 75 cases was obviously an insufficient number from which to draw definite conclusions as to the influence of temperature and humidity, there seemed in this series of cases to be no relation between high temperature, high relative humidity and the case incidence. The case incidence seemed to be more closely related to the incidence of flies, rather than temperature, for the hot weather was almost over before there were many cases of the disease, and reports of new cases continued to come in well through September, though the humid weather had gone. The disease was not more common in the children of foreigners than in those of American parents. The families chiefly afflicted were not the illiterate foreigners, but the careless, neglectful poorer class American family, more particularly the first generation family. This surprising condition might be attributed not to the fact that foreigners were more cleanly, or sanitary, or intelligent than American parents, for in truth they are very much less so. It was due, they believed, to the fact that most foreigners nursed their infants. But one of all these cases was a nursing baby, and this child was nursed only during the night and fed with condensed milk mixtures during the day. Though squalor, poverty and filth went hand in hand with bacillary dysentery, they were not necessary accompaniments, for the disease might be found in the better, roomier and more cleanly portions of the city. In estimating the relation between bacillary dysentery and housing conditions a score card was used somewhat similar to that used for scoring dairies. Forty-one homes only were scored, the highest score being 94 per cent. and the lowest 15 per cent. The average score for those cases of bacillary dysentery that were due to direct contact was only 48 per cent. The average score of those cases that were a source of infection to others was 41 per cent. The average score of cases due to infection from food was 59 per cent., and the average for those cases for which no source of infection was found was 71 per cent. The summary of the sources of infection are as follows: Contact with an acute case, 21 cases; contact with a carrier, 2 cases; contact with a house case, 4 cases; condensed milk epidemic, 15 cases; ice-cream cones, 9 cases; flies, 6 cases; milk, water and fruit, each 1 case; unknown, 15 cases. A number of examples of cases, infections from these different sources, were given, which furnished evidence that the correct source of infection had been located in each instance. An important fact with reference to the contact cases was that many of these contact cases were in the older members of the family, and in these individuals the course of the disease was mild. Undoubtedly many cases of summer "ptomaine poisoning" are truly bacillary dysentery, and though these sporadic cases are not in themselves serious, they may become a great menace to the community, particularly the babies of the community, for, as a future report would show, a mild adult case might readily infect a baby and sometimes with rapidly fatal results. As a general rule, it might be stated that in every dirty or careless house which the writer inspected in which the sick child remained for more than one week there resulted a contact case.

With reference to hospital contacts, it might be stated that 4 babies developed bacillary dysentery upon the wards; each child was admitted with quite a different diagnosis and the disease did not develop for seven to ten days after admission, so that they were undoubtedly contact infections. These were the only contact cases that occurred in the hospital, though virulent bacillary dysentery cases were on board all summer. Extraordinary care must be taken to prevent cross-infection, and no hospital should admit bacillary dysentery unless it had the facilities for isolating these cases, for the most rigid precautions were necessary and particularly absolute fly exclusion. Among examples of particular interest was one of contact infection in which five members of one family, the father, mother and three children, were infected. Several other cases seemed to show very conclusively that the fly was to blame for carrying the infection. The tenement mother was usually careless to protect her infants's stools from flies, and the diapers were seldom boiled, and since flies were so abundant and screens almost unknown it was most extraordinary that more cases were not transmitted in this way. It seemed more than probable that some of the 15 cases of unknown source were due to flies.

The most remarkable epidemic of the summer was the Shiga epidemic, which threaded a devious and devastating path through various communities and gave the best example we had of the various modes of spread of the "casual case" of dysentery. In this instance the epidemic originated with the two-year-old son of a German on a dairy in Haverhill, the source of whose infection was probably ice-cream eaten in Lawrence. This child died. The father, mother and one other child developed diarrhea; the father, being only moderately prostrated, kept at his work on the dairy. The milk of this dairy was sold almost exclusively to the Deaconess's Home, a fresh-air farm for children between the ages of seven and fourteen years. In this institution there were about 20 cases out of a total of 70 children. The epidemic in this institution began on July 22d, and on July 27th the children were all sent to their homes. One of these children went to her home at Pine Heights, Dedham, became seriously ill, and after five days was taken to the hospital. This child's brother and two sisters became ill with the same kind of an infection. The dejecta of these children was thrown into an open privy without disinfection. Within a few days a neighbor's child living directly across the street developed bloody dysentery and died within a few days. About the same time 3 adult members of one family living about one hundred yards away developed severe dysentery, which persisted for a few days only. The evidence seemed to point to flies as the carriers in these last two families. The next case occurred in a child two years old, living next door to the child who came from the home. A woman who helped in the care of the children in the first home infected carried the disease to her husband.

Another interesting series of cases, having for their source of infection a particular batch of a certain brand of condensed milk, was also described.

Dr. Henry I. Bowditch, of Boston, said he had not much to add to Dr. Smillie's talk. Dr. Smillie had encountered many obstacles that would have discouraged others, and in handling the parents, which was sometimes a delicate procedure, he had shown great tact. He had accomplished what he did with the keen coöperation of Mr. Garm of Norbury.

It might be interesting to hear the results of their study of the bacillary cases during the past three summers, for they were especially interested in the dysenteries. In 1914 there were 79 cases coming under their observation, of which 68 per cent. gave a positive Flexner organism; in 1915 there were 75 cases and 85 per cent. showed the Flexner infection; in 1916 there were 64 cases (Dr. Smillie had a few additional ones), and of these 64 cases on the boat 88 per cent. showed the Flexner infection. In 51, or three-fourths of these cases, the bacteria were recovered from the stools and in the others at autopsy, and in a certain few the diagnosis was made by finding the agglutinins. At the same time they had constantly tried to see how much of a factor the gas bacillus or the B. Welchii was in these dysenteries. The B. Welchii was found not to play an important part; it disappeared quickly in the early course of the illness and frequently was seen to reappear later when other foods were given. In 1914 a closer investigation than usual of the B. Welchii was made. Here it was found in 11 per cent. of infectious conditions; in 27 per cent. of digestive disturbances, in 28 per cent. of malnutrition cases, and in 28 per cent. of normal cases. The infectious cases were studied closely, while the other cases were picked at random. Our feeling at present was that the Flexner organism was the main etiological factor, that the gas bacillus is a complicating factor, but probably not the main etiological factor. This was different from the stand taken some years ago.

The mode of treatment carried out on the Floating Hospital this summer, when cases entered with the clinical picture of dysentery, was to keep the child on water for the first twelve hours and then place on a food with a high percentage of carbohydrates and moderate protein, as fat 0, sugar 6, protein 1.2, in the form of a fat-free milk with sugar added. This was continued if the gas bacilli were not present, but when the gas bacilli did occur the carbohydrates were diminished.

SPINAL FLUID IN POLIOMYELITIS--The material for a report by H. L. Abramson (American Journal Diseases of Children, 1915, Vol. X., p. 344) is taken from the records of the meningitis department of the New York City Board of Health and consists of 43 cerebrospinal fluids from 29 patients. He finds that the cerebrospinal fluids of poliomyelitis and encephalitis show abnormal changes in practically all cases, but present no specific characteristics. Fluids from cases of encephalitis generally show a higher albumin-globulin content than do the fluids of myelitis or of the abortive cases. Fehling's solution is reduced by all fluids, but not in equal degree. Examination of the spinal fluid is the most important factor in clearing up the diagnosis in abortive and preparalytic cases.—*American Journal of Obstetrics.*

THE NEW YORK ACADEMY OF MEDICINE—SECTION ON PEDIATRICS

Stated Meeting, Held November 9, 1916

ROYAL STORRS HAYNES, M.D., IN THE CHAIR

ECZEMA DUE TO DEFICIENT THYROID SECRETION IN WHICH THE ADMINISTRATION OF THYROID ACTED AS A SPECIFIC

DR. M. H. EDELMAN presented this patient, a boy three and one-half years of age, born in the United States, of Hebrew parentage. The family history was negative, except that the mother and a sister became gray at twenty years of age. The mother had had two other children and two miscarriages. While pregnant with the patient she was said to have suffered from gravel in the bladder, for which she was under treatment. Her diet during pregnancy and lactation consisted of cooked fruits, cereals, fresh vegetables and milk, but no red meats. The patient had had none of the diseases of childhood, but had furunculosis at the age of six months. The child was weaned at the age of ten months and put on a diet of milk, water, cereal and fruit juices; his diet at the present time was practically the same except that eggs, sugar and butter were given in moderation. The child had been very constipated and slept poorly. Since the age of four months he had had a scaly, weeping eruption, involving the cheeks, forehead, chin, scalp, neck, shoulders, chest and upper and lower extremities. In spite of three years' constant treatment by pediatrists and dermatologists in various clinics, the eruption became more extensive. For the past year the mother noticed the child looking old, not playful, extremely quiet and masturbating. Withdrawal and modification of the diet had no effect on the eruption. The child apparently developed in a normal way and had always been considered a bright child.

On July 22, 1916, he was brought to the Out-patient Department of the Post-Graduate Hospital. At this time the physical examination showed the cretinoid facies, pasty complexion and general glandular enlargement. The mentality was normal. The child stuttered. The head was regular in shape and the fontanel closed. The hair was coarse and abundant, the scalp showing seborrhea and covered with crusts. The skin eruption showed the distribution above described. The eyes had a small opening and reacted to light and accommodation; the pupils were equal; there was edema of the upper lids and puffiness of the lower lids. The eyebrows were deficient; the upper eyelashes were normal, the lower scant and fine. The mouth was open; the nose saddle-shaped. The tongue was moist, clean and seemed to fill the mouth. The tonsils were small and imbedded and adenoids were present. The neck was tense and the child unable to turn his head, due to the tenseness of the skin. The lungs showed a few coarse râles posteriorly. The abdomen seemed enlarged and distended, although the liver and spleen were not palpable. There was a slight umbilical hernia and lordosis. There was hyperplasia of the penis, and a state of priapism; both of the testicles were in the scrotum and seemed to feel normal. The reflexes were normal. The first blood examination showed: hemoglobin, 70 per cent.; red blood corpuscles, 4,200,000; white blood corpuscles, 6,500; polynuclears, 62 per cent.; lymphocytes, 36 per cent., and eosinophiles, 2 per cent. The Wassermann, luetin and von Pirquet reactions were all negative.

The child was given thyroid extract, ½ grain daily. No change was made in the diet. Bran baths were ordered every night.

On August 2d, the child returned looking better. The eczema of the scalp, face and neck had almost disappeared and the eczema of the legs had improved slightly. The mother volunteered the statement that for the first time in three years the child slept through the night. Improvement continued during the following week, but owing to loss in weight the thyroid was discontinued, sugar and fats were eliminated from the diet, and unguentum lassar was used for local application. The patient then became worse and thyroid extract was again administered, ¼ grain daily. Again there was a marked improvement. The child has since been gaining in weight and at the present time is getting 1 grain of thyroid extract daily, but he still retains the cretinoid facies. The skin eruption, while still present, is very much improved.

The interesting points in this history were (1) the premature grayness of the mother and her sister and their rather pasty complexions, suggestive of deficient thyroid secretion, which make it seem probable that the mother was responsible for the child's condition; (2) the persistency and extent of the eczematous condition in spite of careful dietetics and local treatment, which suggested a rather complex etiology; (3) the eczema seemed to bear no relation to the food. The improvement under thyroid extract and the regression when this medication was withdrawn, pointed to a condition of hypothyroidism. A review of the literature showed that a large variety of dermatoses might be due to deficiency of thyroid secretion. In considering the treatment of hypothyroidism it must be borne in mind that a child with deficient thyroid secretion had lessened metabolic powers. Talbot found that the metabolism of a cretin three and one-half years of age was about equal to that of a normal child eight months of age. This meant that we must give less food to these children at the beginning and increase the food as they improved. Fairly large doses of thyroid extract should be administered at first, in order to remove the results that might have been produced by privation of thyroid secretion; later smaller doses were given to maintain a normal equilibrium and prevent a recurrence. In conclusion, it might be said that if we regarded lesions of the skin as symptoms rather than a disease greater progress would be made in diagnosis.

DYSTONIA MUSCULORUM DEFORMANS

Dr. James Louis Joughin reported this case. He said that dystonia musculorum was one of two names given by Oppenheim to a peculiar disorder of station and locomotion first described by him in 1911. He had also called the disease "dysbasia lordotica progressiva," but preferred the former appellation and it had been the one more generally accepted. On the basis of 4 cases Oppenheim described the essential characteristics of this disease as characterized by tonic and clonic spasms of the muscles supporting the pelvis and the lumbar and abdominal muscles and the muscles of the upper and lower extremities. He said that it occurred among children or young adults of Jewish parentage. The onset was insidious, being manifested first in the arms, though the pelvic girdle and the lower extremities were ultimately most affected. As a result of these tonic and clonic spasms the body assumed a bizarre posture not met with in other affections. The trunk was slightly flexed forward in the early cases; in those of longer duration it was markedly so. In addition to this the trunk tended to sag to one side and at the same time rotated somewhat upon the pelvis. The patient attempted to overcome this forward ptosis by placing the hands upon the thighs just below the groins, and as the disease progressed and the trunk continued to increase its forward flexion he slid his hands down the anterior aspect of the thighs until finally he stood propping up the trunk with the hands resting above the knees. The arm or arms were usually held with the forearms pronated. Active supination was often impossible and on attempting to passively supinate the arms this was usually opposed by a marked series of clonic contractions appearing in the pronator radii teres and internal rotators of the arm, which tended to restore it to the pronated position. The lower extremities varied somewhat in position, generally one leg being more affected than the other and the patient stood by preference on the less affected leg. The legs were usually flexed and were sometimes adducted or rotated inward by the tonic spasm of the muscle groups. Talipes equinus varus was an early and frequent deformity. This peculiar posture, so marked when the patient was standing, became immensely exaggerated as soon as he attempted to walk. Tonic contractions of the abdominal, lumbar and thigh muscles jerked the trunk forward, backward or to either side. Nearly all of these deformities, and especially those of the spinal column, disappeared when the patient was either dorsally or ventrally recumbent. The reflexes varied within narrow limits from time to time. Generally there was weakness of the tendon reflexes of the more spastic extremities. There was no pain and no objective sensory disturbance. In Oppenheim's cases the sphincters, cranial nerves and speech were unaffected; there was no paralysis and the mentality was normal. The course of the disease was slowly progresive with remissive tendency. No etiological factors had been decided on.

The case reported varied from this description to a slight extent. The patient was a girl, nine years of age, whose family and personal history were negative as regards the dystonia. The trouble began in May, 1915, with slight jerking of the right arm and turning in of the left foot; shortly after she began to bend forward and her condition was as follows: The tendon reflexes were very variable; the left knee-jerk and the ankle-jerk were sometimes easily obtained and other times only with great difficulty; the attitude was that described by Oppenheim. The left leg was held extended and inwardly rotated; the great toe was usually extended, and the other toes were occasionally widely separated. Myoclonic contractions could be plainly felt in the left anterior tibial groups and the toes separate, extend and flex in a way suggestive of athetosis. The foot was in the varus position and the patient walked on the outside of it. It could easily be completely everted, but a series of strong clonic contractions on endeavoring to evert it were thus produced; it at once again became everted. The right arm was held partially abducted, partially flexed, inwardly rotated, and the forearm pronated. Myoclonic contractions also occurred in the muscles of the shoulder and upper arm. The patient could supinate the forearm, but it was at once jerked back again into the pronated position by strong contractions of the pronator radii teres. The patient walked by advancing the inwardly twisted left leg a few inches and dragging the right foot up to it. The jerking of the trunk described as occurring when the patient attempted to walk was very little evident. On removing her hands from the thighs the whole trunk collapsed forward and the tortion of the trunk and the tipping of the pelvis materially increased. The kyphosis disappeared on lying down and the spine could be flexed dorsally without difficulty. Two series of photographs showed that the disease was slowly progressing. The patient had a stutter or stammer of the functional type, which was the last of her symptoms to develop.

Oppenheim first considered these cases to be of hysterical nature or a peculiar form of double athetosis. At the time of the publication of his article he considered them as due to some undetermined lesion of the brain analogous perhaps to the anatomical basis which we inferred existed in paralysis agitans. This view was not generally accepted; most men to-day regard the disease as a peculiar form of tic neurosis or possibly another of the multiform manifestations of hysteria. Opposed to Oppenheim's view was the absence of any organic disturbance of the central nervous system and the widespread and fluctuating symptoms which it would be difficult to reconcile with an antomical lesion. Opposed to the functional view was the absence of suggestion and emotion as the generic factor, the chronic progressive course, and the change in the reflexes not met with in a purely functional condition. However, the writer felt that it would be ultimately definitely included in this latter category.

SPLENOMEGALY

Dr. Roger H. Dennett reported this case. He said that since 1882, when Gaucher reported the first case of primary splenomegaly, 14 authentic cases had been reported in the literature, all occurring in seven families. Eight children of these same families died during infancy of unknown diseases. In only 6 cases was the diagnosis absolutely authentic. The congenital character of this affection was very evident, since more than 1 case in a family occurred in all but 2 of the cases reported. Of 8 authentic cases that had been verified, 5 by autopsy, and 3 by the antemortem removal of the spleen, the pathological findings had been identical. The liver and spleen were enormously enlarged, retained their normal shape and macroscopically were firm and resistant. Microscopically, the spleen showed a large number of alveolar spaces filled with large endothelial cells which were typical of the disease and which, together with the connective tissue, were the cause of the increased size of both liver and spleen. The symptomatology and physical findings of primary splenomegaly consisted of an enormously enlarged spleen, a somewhat enlarged liver, unaccompanied by any enlargement of the lymph nodes, or by any marked change in the blood. The patient usually sought treatment because of the enlargement of the abdomen which had attracted attention, often without symptoms. Some of these children seemed exceptionally strong and athletic, as, for instance, the case presented. He thought nothing of a thirty-five-mile canoe trip and was, in fact, working particularly hard to reduce his waist line, as it annoyed him merely from the esthetic standpoint. So far as the blood was concerned, there might or there might not be an anemia. At certain stages the red cells might number as many as 6,000,000. In the present instance, repeated examinations during the past ten years had never shown the red cells to be below 4,000,000, or the hemoglobin below 75 per cent. There was never any increase in the number of white blood cells, but there was occasionally a leukopenia. In the differential count the lymphocytes had been reported in some of the cases, and early in this instance there was a relative increase in the lymphocytes, that was, when the boy was eleven or twelve years of age. There were now 67 per cent. polynuclears and 31 per cent. lymphocytes. The prognosis was one of the most interesting phases of the disease, since the patient usually died of some intercurrent affection and not of the disease itself. Of the 14 cases reported only 3 were said to have died of the disease itself, and even in these there was some doubt as to whether death was due to the disease under consideration. The advisability of splenectomy was extremely doubtful, since the liver continued to increase in size after the spleen was removed; the mortality of the operation was high; the disease evidently did not give the victim any discomfort, and it did not, in all probability, shorten life.

The patient presented had been under Dr. Dennett's observation for ten years. He was now twenty-one years of age. The family history was absolutely negative. There were 6 children in the family; the mother had had no miscarriages. One child died of typhoid fever at the age of seventeen years and another of a disease said to be malaria. The former of these had had splenic enlargement for years, the cause of this enlargement not being known to his mother. When first seen by Dr. Dennett in 1906 the physical examination of the patient was negative, except for the enlargement of the liver and spleen. The boy was of average size, though short in stature, with a round, rather fat face and lips a little thick. The tonsils were slightly enlarged. The heart and lungs were negative. The upper border of the liver was at the sixth rib in the nipple line; the lower border was two inches below the costal margin. The spleen occupied the whole of the left half of the abdominal cavity as far as the umbilicus, extending down into the pelvis. The notch could be plainly palpated. The glands were not enlarged. The blood count showed 5,000,000 red blood cells, hemoglobin, 85 per cent., 6,000 white blood cells, 55 per cent. being lymphocytes, 30 per cent. polynuclears, 12 per cent. transitionals and 3 per cent. eosinophiles. During the ten years that this boy had been under observation he had had a great many blood examinations, usually two or three a year, and except for the change in the differential count, that was the increase in polynuclear leukocytes, the blood picture was the same to-day. The last blood examination, November 4, 1914, showed 4,000,000 red blood cells, 6,000 leukocytes, 67 per cent. polynuclears, 31 per cent. lymphocytes and 2 per cent. transitionals. The Wassermann test had been repeatedly negative.

ACUTE MYELOGENOUS LEUKEMIA IN AN INFANT

Dr. Godfrey R. Pisek said the blood diseases in early life, and particularly the leukemias, were still an unsolved problem.

The leukemias were uncommon in children and the myelogenous variety was rare. Cassel, in a series of 3,000 autopsies, found only 2 cases of leukemia during the first decade of life. The myelogenous variety was at least five times more rare than the lymphatic form. In a careful search of the literature 19 authentic cases of myelogenous leukemia were found, of which 7 were less than two years of age. The case with the highest cell count was reported by Hutchinson; in this instance the white blood cells were 1,580,000, of which 59.3 per cent. were myelocytes. The case reported was of interest because of the tender age of the child, because it was of the myeloid variety, and because of the autopsy findings.

This case was a baby, fourteen months of age, who had been healthy until ten months old. The family history was negative. Five other children, ranging from seventeen to eight years of age, were apparently healthy, normal children. When ten months of age an eruption appeared on the child's face and the mother took him to the Essex Street Dispensary, where he was under treatment for three weeks, when the eruption disappeared. Two weeks later the infant fell from the arms of his sister, and that evening the mother noticed a small lump on the child's face, on the right side near the ear. The following morning a similar lump was noticed in the upper right hypochondriac region. The mother then called in a physician who sent her to the dispensary. About this time the child began to have green stools, later streaked with blood. The mother took the child to Gouverneur Hospital, where he remained for a week, when she took him home for two weeks. She then brought him to the Post-Graduate Hospital. The child was breast-fed, but was apparently receiving also the regular family diet. At this time both ears were discharging profusely and there was swelling in the parotid region, which had been present for a week and which steadily increased. The child was emaciated and prostrated, his color *café au lait,* the mucous membranes pale, and the musculature flabby. The anterior fontanel was open, the eyes sunken, the lymph nodes enlarged in the cervical axillary and inguinal regions, the abdomen distended and there was a visible tumefaction over the left side. The nasal and aural discharge was purulent, the liver enlarged 6½ cm. below the free border; the spleen markedly enlarged to the crest of the ileum below and to within 2 cm. of the umbilical line.

The pus from a parotid abscess showed gram positive streptococci. The leukocytes numbered 118,000; polynuclear neutrophiles, 55 per cent.; lymphocytes, 35 per cent. (large, 10 per cent., and small, 25 per cent.); myelocytes, 20 per cent. The following day, after the above count, the red cells were 2,480,000 and hemoglobin 25 per cent. Two days after the first count the leukocytes had increased to 173,600 and the lymphocytes to 36 per cent. The myelocytes were 6½ per cent., of which the neutrophiles were 6 and basophiles ½ per cent.; the erythroblasts were 3, normoblasts 2 and megaloblasts 1 per cent. Vomiting, diarrhea and prostration were the chief symptoms. The temperature varied from normal to 101°F. for five days and then rose to 103°F. and continued with marked remissions to rise to 104°F. on the last three days. Thirty-five c.c. of the mother's blood were injected without any apparent benefit. The patient died eleven days after admission to the hospital and the autopsy was performed three and one-half hours after death.

The autopsy findings showed that the abdominal cavity contained about 100 c.c. of a clear, straw-colored fluid. The stomach was filled with gas and pushed downward below the umbilicus by the greatly enlarged liver, which extended 8 cm. below the costal margin in the median line. The spleen was greatly enlarged, extending downward to the brim of the pelvis. There was no increase of fluid in the thoracic cavity. The lungs were for the most part soft and areated throughout. In the left was a nodule 1½ cm. in diameter in the upper lobe, which on section was found to be caseous in the center with a fibrous capsule surrounding. Several of the bronchial nodes were enlarged. The spleen was partially covered over with a white fibrous membrane, which might be stripped off with slight difficulty. It was grayish-red in color and rather firm in consistency. It weighed 260 grams. On section it was light bluish-red in color and had a coarsely granular pulpy appearance. It was quite friable. In the gastrosplenic omentum was an oval body measuring 5 x 3 x 2 cm., which resembled splenic tissue and was probably a hyperplastic accessory spleen. The liver was motley yellowish-red in color, smooth and rather firm in consistency. On section, it showed a fine mosaic structure of yellowish-red areas outlined by columns of deeper red which was probably due to a combination of congestion and fatty degeneration. The cortex of the kidneys appeared swollen. The external lymph nodes were palpable, but not definitely enlarged. The bronchial nodes were moderately increased and the mesenteric glands were enlarged, especially about the head of the pancreas. They were light yellowish-red in color, rather soft in consistency and presented a structureless light-red and friable cut surface. The bone marrow in the gross appeared congested and abundant in soft cellular material.

The microscopic examination showed a large caseous tubercle in the left lung, with numerous smaller tubercles surrounding it. There was considerable fibrosis of repair about the older tubercles, but judging from the presence of small, apparently newly-formed tubercles the process was still active. Examination of the spleen showed that the white cells were very numerous and consisted of polymorphonuclears, large mononuclears, and lymphocytes. The predominating cell was the large mononuclear type. The nuclei of the mononuclear cells were frequently kidney shaped and resembled those of myelocytes. The cytoplasm was fairly abundant and took a bluish-red stain, similar to that of the polymorphonuclear cells. In some instances a suggestion of granulation could be discerned, but it was not distinct. Rarely a nucleated red cell was found. While it was difficult to determine with certainty the exact nature and origin of the predominating cells, it seemed highly probable that they were of the myelogenous type. The enlarged glands in the neighborhood of the spleen were almost identical in microscopic structure to the spleen and it was questionable whether they represented lymph nodes or accessory spleens.

The liver presented a very striking picture of an extreme capillary engorgement with myelocytic cells. The engorgement was more marked around the periphery of the lobules, where many of the liver cells showed evidences of atrophy and fatty degeneration. Occasionally there was found a collection of myelocytes which had extravasated from the vessels, but most of them still remained within the capillaries. The percentages of myelocytes appeared to be greater in the capillaries of the liver than was counted in the blood. The kidneys presented a condition somewhat similar to that observed in the liver, but the engorgement was not so diffuse. The bone marrow taken from the shaft of the femur, ribs and vertebræ all presented a similar picture. The result of the microscopic examination was as follows: Splenomegaly; leukoplastic hyperplasia of the bone marrow; enlargement of the abdominal lymph nodes; engorgement and enlargement of liver and kidneys with myelocytic cells, and congestion and engorgement of the lungs.

In closing, Dr. Pisek stated that careful blood examinations alone enabled one to classify these conditions and the prognosis had thus far been uninfluenced by the use of the X-ray, salvarsan or atoxyl. Possibly serum injections and repeated injections of homologous blood might be of value particularly in cases in which an early diagnosis was made.

DR. L. T. LE WALD said he would like to know whether the Roentgen ray findings in myelogenous leukemia bore any relation to those found in chloroma. The findings in chloroma, both in the bone medulla and the cortex seemed to be quite characteristic. Dr. Le Wald said he would also like to know whether this case of Dr. Pisek was examined roentgenographically and, if so, what the findings in the bones were.

DR. PISEK replied that he did not know what the X-ray findings were in this case, as there had been no attempt to find them. As the disease was so rare he thought, however, that we should in the future follow out every avenue of research. That there was a definite relationship to chloroma did not seem possible.

DR. ELIAS H. BARTLEY said they had a case of myelogenous leukemia at the Long Island College Hospital recently, in which the X-ray examination was made, but it showed nothing. The autopsy gave very nearly the same picture as has just been described by Dr. Pisek. In this case the mesenteric glands were enlarged and looked like a bunch of grapes. They found nothing else aside from the microscopical picture. The history of this case was the usual history of all these cases; they go down grade rapidly and die. In our case there were no petechial hemorrhages, but there was nose bleed and gastrointestinal disturbance, but we did not know whether to attribute this gastrointestinal disturbance to the leukemia or to a severe ulcerative stomatitis. The patient's mouth had an extremely foul odor and the X-ray examination showed suppuration under many of the teeth. They thought that a great deal of the rapid decline was due to the suppuration of the teeth.

DR. BRENNAN said that apropos of Dr. Pisek's case he would like to speak of a very interesting case of his. A young boy came to his office with a tonsillitis and enlargement of the glands of the neck and inguinal region. The blood findings in this case gave the picture of myelogenous leukemia, and on the following day there was enlargement of the complete superficial lymphatic system, so marked that it looked as though the boy had a general infection. His head had practically disappeared into his neck and his spleen and liver were greatly enlarged; by the end of fourteen days they entirely filled the abdomen; his girth increased from twenty to thirty-nine inches, and his spleen became palpable 9 cm. below the costal margin in the median line. The liver was a little lower. Iron and arsenic were administered, but nothing did any good. The patient went down hill rapidly and died. He was unable to get an autopsy. At that time he suggested as a name for this disease malignant or fulminating leukemia. The blood count was 858,888 white cells, 98 per cent. mononuclear leukocytes, 0.7 per cent. myelocytes and eosinophiles, each 0.1 per cent.

Another case recently came under the speaker's observation, which also started with a tonsillitis. In this instance the patient complained of nothing particularly, but the skin exhibited a lemon green color. The blood only showed 17,400 white cells, about 3,000,000 red cells, hemoglobin 70 per cent. On October 23d he was attacked with severe nose bleed, which could not be controlled except by packing the posterior nares. They put in a Bernet plug and got a terrific necrosis of the mucous membrane of the nose. Every time they attempted to take out the plugging bleeding recurred. The blood count showed 50,000 white cells. The patient was treated by blood transfusion and after the third transfusion there was no enlargement of the glands in the axillary or inguinal region; only a few epitrochlear glands were still enlarged. The boy seemed to be absolutely comfortable and the blood picture was improving. Clinically they had done a great deal for him by the blood transfusions. This case was very interesting; everyone gave a different diagnosis; some said it was a leukemia and some that it was Hodgkin's disease.

DR. J. S. FERGUSON said that this case and the discussion both point to a possibility that has been in his mind for some time. It was suggested by cases of Hodgkin's disease, first in an adult and then in a child, viz., a possible relation of chronic infections to both myelogenous leukemia and to Hodgkin's disease. Dr. Pisek's case had no chronic infection except tuberculosis; it did show a tuberculous process in the lungs, which gave evidence of recent activity. The case described by Dr. Bartley showed extensive suppuration in the mouth. In the speaker's cases simulating Hodgkin's disease he observed marked septic infection in the mouth. The case discussed by Dr. Brennan showed a possible infection through the tonsils.

One case which he watched for some time had an extensive mouth infection, and following the cleaning up of the mouth the glandular and splenic enlargement disappeared. The glands removed in this case showed tuberculous changes and a process appeared in the lungs which was also characteristic of tuberculosis both on physical and X-ray examinations; that the X-ray plates were exhibited as showing a typical miliary tuberculosis. That boy improved under ordinary surgical treatment, first cleansing the mouth, then removal of the grossly enlarged glands and finally the usual treatment for tuberculosis, which included the use of tuberculin. Dr. Ferguson said he would not suggest that cases of myelogenous leukemia were related to tuberculosis, but it did seem to him that if we regarded the various types of hematopoietic disease as having possible etiologic factors in suppurative and chronic infections of the body we would not be far amiss.

NEW YORK AS A PEDIATRIC CENTER

Dr. Henry Dwight Chapin presented this paper. (This will appear in a later number of the Archives.)

CLINICAL CONDITIONS WHICH MAY BE ACCOMPANIED BY ACIDOSIS. A STUDY OF CASES WITH THEIR TREATMENT

Dr. Marshall C. Pease said the term acidosis as generally used had merely indicated the presence of acetone in the urine. The assumption had been that these acetone bodies were very abnormal and signified an unusual complication, whereas, as a matter of fact, they appeared at all times in small amounts in the urine and were apt to occur in children at some period in easily demonstrable amounts in most of the infectious diseases. Acidosis might be considered as the failure to normally regulate the normal processes. There was a continuous elaboration of many kinds of acids, such as sulphuric and carbonic, in the body. These acids were normally neutralized or removed from the body, so that the tissues and fluids were constantly of a definite degree of alkalinity. The normal preponderance of alkali over acids largely depended upon the maintenance of alkali reserve, which was very largely sodium bicarbonate. The production of large amounts of acids, such as those in the acetone series, if they were entirely or largely excreted without affecting alkali reserve would not result in acidosis. The same might be said of the acids that were capable of being neutralized by the alkalies of the food or by the ammonia made from urea. Acidosis resulted when the production of acids was so great that they could not be neutralized without diminishing the reserve alkali. The normal preponderance of bases over acids was disturbed when the acids were produced in excess or when there was interference with their elimination.

The most striking symptom of acidosis, clinically speaking, was an alteration in respiration, which became of the abdominal and costal type, the most noteworthy feature of which was the distinct effort that was involved and the increased amplitude. There was no evidence of obstruction or cyanosis. The object of the dyspnea was to increase ventilation. The necessity for increased ventilation was found on an increasing tendency for a shifting of the reaction of the blood from normal alkalinity in the direction of acidity. In order to maintain the normal reaction of the blood there must be more rapid elimination of carbon dioxide, so that the carbon dioxide in the blood, and therefore the carbon dioxide in the air of the alveoli of the lungs, would be less than was normally present. In other words, the carbon dioxide tension or percentage was lowered. Consequently the simplest and easiest method of determining the presence or absence of acidosis was to measure the percentage of carbon dioxide in the blood or in the air of the alveoli of the lungs. In a series of 37 cases the carbon dioxide tension of the blood gave not only a positive diagnosis, but suggested the ultimate prognosis. In the few cases in which the carbon dioxide tension of the alveolar air had been made the findings had been quite as satisfactory as those in which the carbon dioxide blood tension was made. In a series of 14 normal cases the average finding was 40 mm. and the variations above and below this figure were not over 5 mm. In the blood work the Van Slyke apparatus was used. In testing out the carbon dioxide tension of the alveolar air, Marriott's method was very satisfactory. Marriott's apparatus, a modification of the Plesch-Higgins apparatus, was portable, took only a very few moments to do, required no special skill, and was inexpensive. The Van Slyke apparatus was a moderately expensive laboratory instrument, which called for skill in making the test and in getting the necessary amount of blood. It had not appeared that clinically there was any gain from the standpoint of diagnosis or of prognosis sufficient to make either method the method of choice.

An acidosis might be produced in three ways: (1) By the introduction of acids from the outside, as for instance through the alimentary tract; (2) by a failure in the excretory organs, so that acids which were normally excreted were gradually accumulated in the blood stream, and (3) an insufficient amount of alkali in the organism, perhaps as the result of abnormal loss of bases.

Probably the most common clinical condition in children which might be accompanied by acidosis was the so-called food intoxication. The symptoms of acidosis were first restlessness and sleeplessness, which gradually changed to somnolence and finally to coma. Inspiration and expiration became more and more exaggerated, in order to increase the ventilation of the lungs and finally developed into dyspnea of the "air hunger" type. There might be a small amount of sugar in the urine. Prostration was severe and there was evidence of an enormous loss of fluids. The death rate had been in the neighborhood of 80 per cent. The amount of actual diarrhea present bore no constant relation to the degree of acidosis. A prominent symptom of the onset was the severe vomiting, which ceased as the child passed into coma, and might or might not return as recovery took place. Clinically, the relation between this type of diarrhea and milk could be clearly traced, and the suspicion that the milk was stale was highly probable. A complete elimination of milk from the diet for days offered the most hope of ultimate recovery. The nourishment was supplied by the use of thick gruels and solutions of glucose. If conditions were not too desperate a period of starvation of twenty-four hours would, as a rule, see the end of the acidosis, which, however, might recur if even a small amount of milk was given. In connection with the suggestion that spoiled milk might be a cause of acidosis, it might be observed that a large majority of the 37 cases occurred during the summer months, and especially during particularly hot weather. High fat and sugar feeding resulted in diarrhea, but such diarrhea was not in any circumstances accompanied by acidosis, though they did make the child more susceptible to the conditions which resulted in acidosis. It was a question that had not yet been satisfactorily answered if this type of acidosis was not in reality a form of acute proteid indigestion, since with the high proteid feeding of the present day, proteolytic processes became most prominent in the intestinal tract. Closely related to that form of acidosis which accompanied the above type of diarrhea was recurrent cyclic vomiting. While acetonuria appeared very promptly in recurrent or cyclic vomiting, not all of the cases exhibited definite symptoms of acidosis, in part probably the result of rapid compensatory excretion of acids and in part perhaps due to the vomiting itself. A period of starvation was likewise indicated in acidosis of this nature. A matter which had not received the attention it deserved, both in recurrent vomiting and ileocolitis with acidosis, was the frequent appearance of very large amounts of indican in the urine. This was often a transient finding, which disappeared, particularly if there had been vigorous treatment. A carbohydrate lack in the food did not seem to suggest itself as an etiological factor in either of these conditions. There were other less frequent conditions occurring in children which might be accompanied by acidosis, as diabetes and acute nephritis. In both the acidosis did not often manifest itself, except as a terminal condition. Pneumonia was accompanied by a reduction in the carbon dioxide content of the blood, but the facts seem to have little, if any, relation to the severity or duration of the disease. This was a point that was worthy of further and more extended observation. Dr. Pease stated that the acetonuria which frequently followed anesthesia rarely resulted in a disturbance of respiration or in a lowered carbon dioxide tension, if their limited experience might be considered as any criterion. Extensive burns sometimes resulted in acidosis. The treatment of acidosis should be first a period of starvation and then the return to food should be to carbohydrate and the vegetable proteids, milk and broths being added very slowly and cautiously. The acidosis itself must be handled by neutralizing the acids. Sodium bicarbonate might be given by mouth, per rectum, intravenously and under the skin in an amount sufficient to render the urine alkaline in reaction. If given under the skin the sodium bicarbonate must be specially prepared. The solution might be sterilized and then cold carbon dioxide bubbled through it until the phenolphthalein which had been added was colorless. The solution for intravenous strength should be of 4 per cent. strength, and from 75 to 100 c.c. should be given according to the size of the child. By mouth from 10 to 15 grains of sodium bicarbonate might be given every three hours.

Dr. Pease exhibited the apparatus for collecting the alveolar air and estimating the carbon dioxide tension. The air was collected in a rubber bag, such as is used for inflating a football. A mask was prepared by cutting off the extreme end of a nipple of a wide-mouthed Hygeia bottle, which was fastened to the rubber bag by means of a glass tube and rubber tissue. (This apparatus was described in the Journal of the American Medical Association, May 20, 1916, p. 1,594.) The estimation of the carbon dioxide tension of the air was based upon the fact that if a current of air containing carbon dioxide was passed through a solution of sodium carbonate until the solution was saturated, the final solution would contain sodium bicarbonate and dissolved carbon dioxide. The reaction of such a solution would depend on the relative amounts of alkaline bicarbonate and the acid carbon dioxide present. This in turn would depend on the tension of the carbon dioxide in the air with which the mixture had been saturated and would be independent of the volume of air blown through, provided saturation had once been attained. Low tensions had the reverse effect. The reaction of such a solution might be determined by adding to it an indicator such as phenolsulphonaphthalein, which showed over a considerable range of reaction definite color changes.

Standardized phosphate mixtures, sealed in tubes, the standard bicarbonate solution, color comparison box and accessories are now on the market in such compact form that they are practical for bedside use and so simple that they may be employed by anyone.

Dr. Oscar M. Schloss said he had been interested in the subject of acidosis in infants during the past three years and had made a number of carbon dioxide determinations with various methods. On Dr. La Fétra's service at Bellevue Hospital they had used the apparatus described by Marriott for several months and had found it very useful and sufficiently accurate for all clinical purposes. It was the simplest method that had been presented and been used by the internes with perfectly satisfactory results. It was due to the work of Howland and Marriott that acidosis had been shown to accompany the so-called alimentary intoxications, and the results which the speaker had obtained with various methods were almost identical with theirs. The only clinical signs which aided in the diagnosis of acidosis was the presence of increased pulmonary ventilation or hyperpnea. This, however, was not present constantly in all cases and it was only by means of one of the laboratory methods that the diagnosis could be made with certainty. The simplest and most accurate of these was the determination of the carbon dioxide of the alveolar air, or the carbon dioxide combining power of the blood plasma according to the method of Van Slyke. As Dr. Pease mentioned, acidosis was best treated by means of sodium bicarbonate. The most satisfactory method of administration was the intravenous injection. Dr. Schloss said he had found that it was only in this way that a prompt result could be obtained. In most instances repeated injections were necessary and the number and frequency might be determined by the carbon dioxide estimation. Despite the improvement which attended this treatment, a great number of these infants died. A few died from a recurrence of the acidosis, but in most instances death was due to a severe malnutrition.

THE AMMONIACAL DIAPER IN INFANTS AND YOUNG CHILDREN—According to J. Zahorsky (American Journal Diseases of Children, 1915, Vol. X., p. 436) if much ammonia is present, severe irritation and vesication of the diaper region may occur. The ammonia is derived from the ammonium compounds in the urine, and is liberated by an alkali present in the diaper—soap, lye, lime or stool. When the diaper, which has been washed in a strong alkaline soap, is not thoroughly rinsed in clear water, sufficient alkalinity remains in the cloth to decompose the ammonia in the urine. This is the origin of the "common" saying that strong soap or lye in the diaper blisters the baby. It is not the alkali or soap on the skin, but the ammonia produced, which causes the skin irritation. An alkaline stool mixed with urine acts the same way, and we have often attributed an intertrigo to irritating feces, when it was really caused by ammonia.—*American Journal of Obstetrics.*

DEPARTMENT OF ABSTRACTS

ORIGINAL CONDENSATIONS OF CURRENT PEDIATRIC LITERATURE BY THE EDITORS AND THE FOLLOWING ASSOCIATES

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J. Herbert Young.......Newton, Mass.

ADAMSON, H. G.: HERPES RECURRENS. (British Journal of Children's Diseases, July, 1916, p. 193.)

Herpes febrilis or herpes recurrens may attack not only the lips, but the cheek, chin, nostril, dorsal surface of nose, the lobe of the ear, buccal mucous membranes or the skin or mucous membranes of the genitals, either in association with an acute infectious fever or a common cold. Adamson regards this condition as distinct from herpes zoster. He believes it probable, as Schamberg has suggested, that there is a toxin common to the various infections with which it is associated, which has a special affinity for nerve tissue and particularly for the sensory ganglia. There is a report of 6 cases of recurrent herpes. Case 1, facial herpes, boy nine years old, eruption first spread on check at one and one-half years, twenty-five to thirty attacks, each attack associated with fever. Case 2, facial herpes, boy six years old, second attack associated with fever. Case 3, facial herpes, girl fifteen years old, many attacks, always associated with cold, first attack occurred as a baby. Case 4, herpes of buttock, had many attacks on lips, twice before on buttock. Cases 5 and 6 were recurrent herpes on neck and wrist respectively. In each instance there had been many recurrences upon the same area. Adamson advises the removal of any source of reflex irritation, such as adenoids, dental trouble, eyesight defects and intestinal worms in case of herpes of buttocks as of value in treatment. He has used quinin, 2 to 5 grains, at onset of attack to abort it and also local application of collodion before vesicles have matured, or a calamine lotion if they have already formed, is recommended. There is a good bibliography. J. B. M.

BECKER, HARVEY MAYER: COMPLICATIONS IN TONSIL AND ADENOID WORK, WITH ESPECIAL REFERENCE TO CHRONIC SUPPURATIVE OTITIS MEDIA. (Annals of Otology, Rhinology and Laryngology, June, 1916, p. 439.)

The author presents a method he has used in 31 discharging ears, discharging from two months to two years, of treatment at the time of removing adenoids and tonsils as part of a cure of these cases. Immediately after the tonsil and adenoid operation the ear canal is wiped free of all discharges and the condition of the drum made out. When there is a large perforation, drainage is deemed sufficient; otherwise a paracentesis is performed to include the perforation, if possible, but if the perforation is in the anterior half of the drum, it is disregarded. After gentle aspiration, the canal is again dried and a 5 per cent. alcoholic solution of iodin is freely placed in the canal, so that it flows through the perforation into the middle ear cavity. It usually finds its way into the nasopharynx through the Eustachian tube and may be assisted by gently using alternate pressure and suction. A dry wick of gauze is then placed in direct contact with the drum and this is removed in two days. In the 31 ears, only 4 had not ceased to discharge when the wick was removed. Several large perforations required some stimulation to get them to close. In no ear was the hearing less after this procedure than it was before. A majority showed improved hearing. The children have been inspected once a month, and in those whose ears became dry no discharge has since been seen. S. W. T.

MATHIS, EDGAR G.: CONGENITAL UMBILICAL HERNIA. (Texas State Journal of Medicine, October 16, 1916, p. 261.)

The author defines this condition as a tumor of variable size, containing one or several abdominal viscera, seated at the umbilicus in children at birth. The heart or liver has occasionally been found as part of the contents. It is a very rare condition, occurring in one out of every 5,000 births in a series of 20,000 reported from the maternity hospital of Munich.

In this country, one of the earliest cases was reported in 1815 by Dr. Benedict, of Birmingham, Ala.

In 1905 Dr. Cumston divided congenital umbilical hernia into two classes—embryonal umbilical hernia, due to an absence of a considerable portion of the abdominal wall, occurring before the third month of intrauterine life and fetal umbilical hernia, which develops after the third month of fetal life.

There are various theories as to the etiology of this condition. Meckel's theory of arrested development of the abdominal wall during the embryonal period is well known. Ahfeld believed that the continued patency of the intestinal canal with the umbilical vesicle beyond the normal time was the prime factor in its development. Chadwick advocates the defective development of the abdominal wall theory, but believes that the unusually large size of the abdominal organs may prevent normal closure of the abdominal wall. Berkeley and Bonney believe that the condition is due to the persistence of the omphomesenteric duct.

This condition is usually very easy to recognize. Occasionally, when the mass is small, there is danger that when severing the cord the bowel will also be involved, causing a fatal fecal fistula.

The author reports 2 cases. In the first case some bowel loops were in the hernial sac, but the larger part of the contents were made up of the child's liver. The infant died eighteen hours after a reparative operation. In the second case, the contents of the sac were intestines. After eleven months the child is well developed, healthy and, with a truss applied, is fairly comfortable.

C. E. F.

HORN, HENRY, AND VICTORS, ERNEST ALBRECHT: A CONTRIBUTION TO THE BACTERIOLOGY OF THE SO-CALLED COCOBACILLUS FETIDUS OZENÆ (PEREZ), WITH ADDITIONAL NOTES ON THE TREATMENT OF CLINICAL OZENA BY MEANS OF POLYVALENT VACCINE MADE FROM THE SAME ORGANISM. (Annals of Otology, Rhinology and Laryngology, June, 1916, p. 251.)

In this article covering seventy-nine pages, with several tables, we have a most complete presentation of the claims of Perez. The authors assert that (1) the Perez bacillus is the true cause of ozena; (2) ozena is a clinical entity; (3) pure Perez vaccine will clear up cases as readily as the old mixed stock vaccines, and (4) a successful vaccine can be produced. Forty-eight cases are presented in which the Perez bacillus was found in 58 per cent., and in every case where a clinical diagnosis of ozena was made one of the two groups—Perez or Friedlander—was found. The conclusion is drawn that one of these two organisms *must* be found to establish a true diagnosis of ozena. The authors also state that true ozena can coexist with active syphilis, in any stage, but syphilis is not the etiological factor of ozena proper. It has been established that in practically every case the mucous membrane of the antrum and sphenoid sinuses is infected with the Perez organisms; no amount of vaccine treatment will cure a case until these cavities have been drained so that no pus is retained. The Perez bacillus is easily obtained from the submucous tissue overlying the turbinates. In regard to treatment, every case is given a beginning dose of 200,000,000 and asked to report in twenty-four hours. If there has been no reaction a dose of 400,000,000 is given and the patient again asked to report in twenty-four hours; if there has been no reaction the same procedure is repeated, the dose being doubled until definite reaction is reported (headache, general malaise, poor appetite, temperature and occasional nausea). The dose causing these symptoms is considered the minimum dose. With this dose as a standard for a given patient, the amount is gradually increased at intervals of three or four days until about twenty injections have been given.

The case histories and tables should be consulted for the more detailed information. S. W. T.

BUFORD, COLEMAN G.: GOITER IN CHILDREN. (Surgery, Gynecology and Obstetrics, May, 1915, p. 35.)

The subject is divided by the author into (1) goiter of infancy under one year of age, and (2) goiter of childhood, one year to adolescence, (3) goiter of adolescence.

Almost 90 per cent. of the older cretins show goiter. Certain results can be brought out of cretinism by early thyroid feeding. It is possible that in some the gland is delayed in development and in the performance of its functions, and if not fed thyroid these children may be permanently damaged.

Goiter among newly born children seems rare to the author, who has seen one case in a baby six days old. Dr. Brooks reports several cases which have appeared about the second day after birth and says that they invariably disappear.

In the goiter of children there is almost uniformly an area well defined in the gland. About 9 in 10 show the lesion in the right lower pole of the right lobe. As the mass enlarges it encroaches upon the median line. In early cases the tumor is hard and well defined. In the more advanced cases the induration is more distinct and the anterior border more rounded. In the still more advanced cases, the tumor is rotund, outlines definite, consistency firm or fluctuating, neck enlarged and capsulation quite complete. When these encapsulated masses are removed they are found to be benign adenomas. These types of goiters are often associated with diseased tonsils.

The symptoms associated are largely proportionate to the apparent changes of the gland. The patients are usually below standard in health and stature. Muscles are soft, posture drooping, fatigue comes easily. They are languid, do not enjoy play and are irritable. The face often shows an old and careworn expression. The hair usually has a gritty feeling. There is often a faint flush to the cheeks. Moisture exudes from the lower eyebrows. Moist cold hands with a coarse or fibrillary tremor limited to the hands is sometimes characteristic. The pulse ranges from 80 to 120.

The treatment is thyroid feeding. The goiter may disappear in six weeks under treatment.

The author believes that the drinking water of the locality is the chief cause of goiters.

Adolescent goiter usually appears as a bilateral affection. When unilateral the enlargement is usually in the right lobe. The enlargement is diffused through one or both lobes, which are boggy and rarely are there any nodular masses. These usually undergo spontaneous cure. When there is no suggestion of hyperthyroidism iodin or thyro-iodin should be given. C. E. F.

GENGENBACH, F. P.: PNEUMOCOCCUS SORE THROAT IN CHILDREN. (Colorado Medicine, January, 1916, p. 14.)

The pneumococcus invasion of the throat, especially when combined with the porcelain-like membrane, can readily be mistaken for diphtheria. There appear to be two types of the infection—where there is no real membrane, only some stringy mucus, but marked edema and enlargement of the glands of the neck; and where there is only slight glandular enlargement, but marked membrane formation. In the 3 case reports there were no new features of therapy. Pneumococcus vaccine was used in 2 of the cases. There is an excellent bibliography. J. B. M.

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